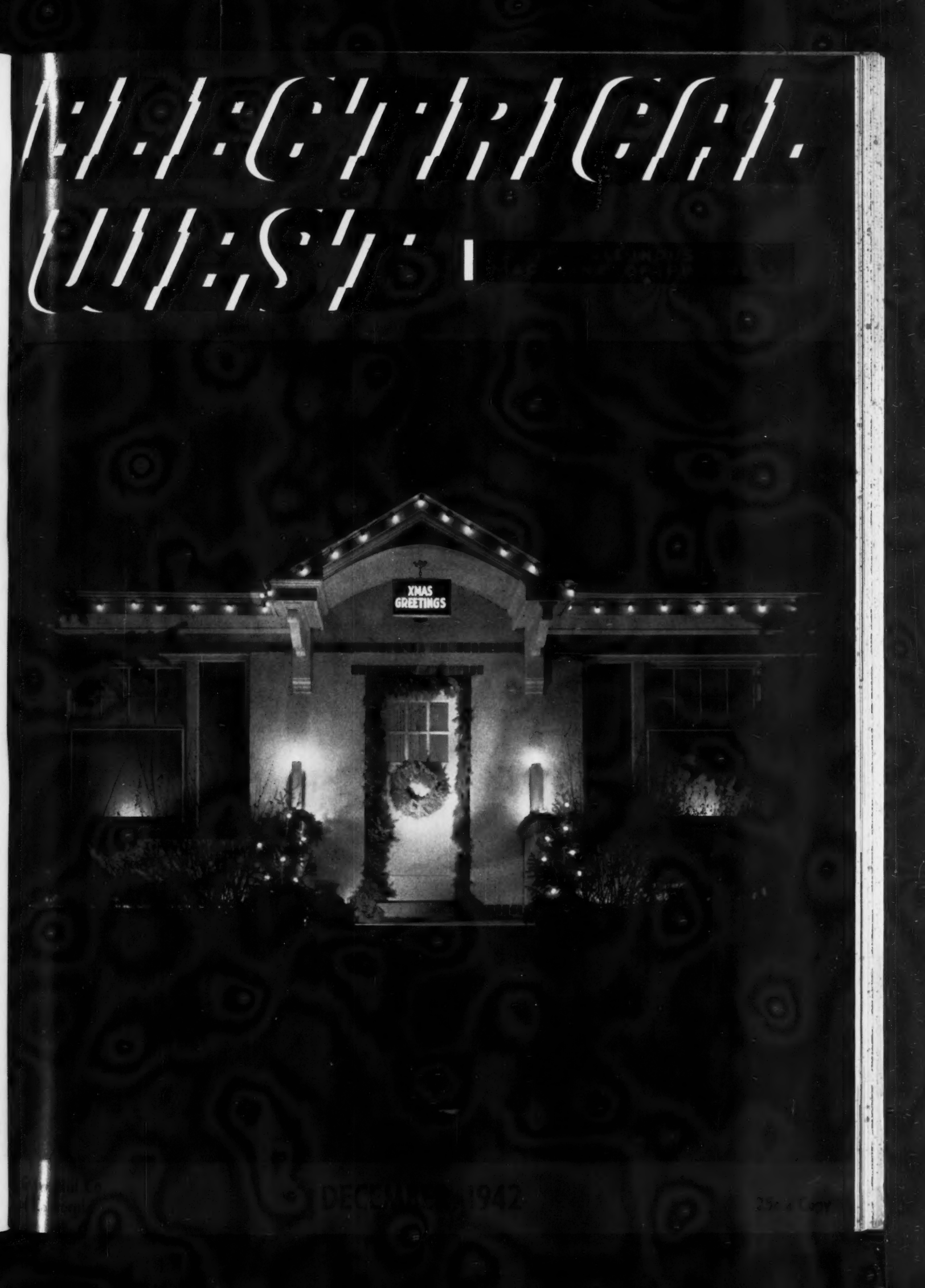
ELECTRICAL WEST



DECEMBER 1942 25¢ a COPY

THE REAL

Electrical Era

IS COMING!

ELECTRICAL WEST (with which is consolidated The Journal of Electricity, December, 1942. Vol. 89, No. 6. Published monthly by the McGraw-Hill Company of California, 68 Post Street, San Francisco, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rate in U. S. and U. S. possessions, and Canada, $2 per year; all other countries $3 gold (thirteen shillings). Single copy 25c.
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CAPACITORS GIVE "OOMPH" TO A POWER SYSTEM

. . . says the Portland General Electric Company

Ann Sheridan, star of "George Washington Slept Here"

"YOU may not be aware of it," says the Portland General Electric Company to its customers, "but there's probably a shunt capacitor in your life! What's a shunt capacitor? Well, they're made of aluminum foil and heavy paper, which are soaked in oil and enclosed in an airtight steel casing. They give electric lines what Ann Sheridan gives to the movies. When mounted on a pole near your home, they increase and stabilize voltage, which helps assure you of a constant and reliable power supply. Last year, to give 'oomph' to its lines, PGE spent $100,000 for purchase and installation of capacitors."

Ask your G-E representative to tell you how G-E Pyranol capacitors can increase system capacity—with great savings in critical materials. Or, write for descriptive bulletin, GEA-3333. *General Electric Company, Schenectady, N. Y.*

GENERAL ELECTRIC

407-48-5700

Quotation is from this advertisement of the Portland General Electric Company. It appeared in the April, 1942, issues of *The Oregonian* and the *Oregon Journal*.

Here in the WEST

DECEMBER, 1942 VOL. 89, NO. 6

People

Nancy Finch
knows food, (p. 48) not only as Utah's best known home economist and nutrition expert but as duck hunter and fisherwoman. A Utah State Agricultural and Columbia alumnus, she has taught both business and home economics, was home service director and now is Utah Power & Light's assistant manager of domestic sales.

Hugo A. Bedau
speaks from experience (p. 39) as a San Francisco business man, who owned and operated a successful business machine distributorship. He is a past president of the S. F. Sales Managers Assn., past vice-president, National Federation of Sales Executives.

Donald R. Jenkins
of Grand Junction, Colo., has studied synthetic rubber (p. 42) as he did oils to win the Salt Lake City ASME thesis award in 1940. A University of Utah graduate, he joined Westinghouse, was at its New York World Fair exhibit, and is

now steam engineer for the company's Los Angeles office.

Pages

"The Third Component" 39
By HUGO A. BEDAU—Faith and understanding essential between management, worker and customer, says this businessman.

Synthetic Rubber Processes 42
By DONALD R. JENKINS—A review of the rubber situation with reference to steps being taken to produce synthetics.

Farm Production in Wartime 61
By H. B. WALKER—American farmers face problem of increasing production with less manpower and equipment.

Busway and Plant Distribution—I 64
By LESTER SIEBERT—War production efficiency plus peacetime plant conversion inherent in modern enclosure design.

Books 10
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Lighting and Wiring 64
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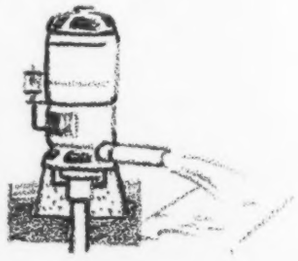
Cover photo: In memory of happier Christmas seasons which we aspire to see returned with peace—the home of A. J. Walter, General Electric Co. Lamp Dept., in Denver, the "Christmas City of the World."

Preview

Two Continued
articles from this issue will be concluded in the next issue, that on synthetic rubber and the one on busway distribution systems. Space did not permit their full length this time because other timely news crowded for immediate attention. With these concluding articles will be an array of varied subjects which should find interest to all kinds of readers. Dealers, for instance, will find a possible manpower answer in an account of one firm employing physically handicapped people.



Paradox
it may seem, but practical reality it is, as will be shown in an article by E. G. Stahl of Fresno, in our next issue, that when a farmer is sold a smaller pump and uses less power, he is a more profitable customer to the utility and a more successful farm operator. Stahl believes this principle can be applied to much utilization engineering.

House Wiring
is undergoing some pretty radical simplifications under war material restrictions, but none so interesting as that devised by a Pocatello contractor for a large number of Ogden war workers' houses. His mass production, prefabrication methods will be told in picture and word in the next ELECTRICAL WEST. There will be other articles and news as valuable to all.

Oil-Immersed tape is used to splice high voltage cables because: Low power factor is maintained. Its dielectric strength on 12 mil. thickness after elongation is 1,000 VPM. Tensile strength averages not less than 35 lb. per inch of width.

Because of its high dielectric and tensile strength, Irvington Seamless Bias Varnished Cambric Tape, Dry-Packed, is used not only as the final wrapping on splices of high voltage lines but also for splicing low voltage cable.

PUT YOUR SHORT LENGTHS OF CABLE TO WORK

SAVE CRITICAL MATERIALS

Don't scrap your short lengths of cable. Splice them to longer lengths with Irvington Oil-Immersed and Dry-Packed Varnished Cambric Tapes. These materials permit you to make the soundest possible splice on both high and low voltage cables. Both tapes make neat, firm windings because they are seamless bias and have high tensile strength together with excellent elasticity.

ON HIGH VOLTAGE CABLE—SPLICE WITH OIL-IMMERSED TAPE — Irvington Oil-Immersed Tape has a low power factor which is maintained after the splice is made. The reason for this is the special processing which the tape undergoes in manufacture and packaging. Not only does this processing maintain low power factor but it also preserves the tape's high dielectric strength. Oil-Immersed tape is shipped in 4 and 18-yd. rolls. Usual splicing thicknesses of 7, 10 and 12 mil. in black are available. Yellow can be obtained on special order. This tape meets N.E.M.A. specifications.

ON LOW VOLTAGE CABLE—SPLICE WITH DRY-PACKED TAPE — Cut from Seamless Bias Varnished Cambric, this tape is supplied in tightly wound rolls which are completely waxed to seal against moisture and air. This sealing prevents deterioration and maintains the dielectric strength of the tape during storage. It is available in usual splicing thicknesses of 7, 10 and 12 mil. in black and yellow. Irvington Dry-Packed Varnished Cambric Tape conforms to N.E.M.A. specifications.

FOR OIL-TIGHT SPLICES AND CONNECTIONS—USE HARVEL OIL STOP — This product is a phenol-formaldehyde synthetic resin. It is applied as a liquid and polymerizes at ordinary temperatures into a firm, enduring, infusible insulation. Oil Stop is used to make stop joints and for oil-tight splices on rubber to paper and paper to paper insulated cables.

For complete information on Oil Stop, Oil-Immersed and Dry-Packed Varnished Cambric Tape, write Dept. 126.

IRVINGTON

VARNISH & INSULATOR CO.

Manufacturers of a complete line of varnished insulation materials, insulating varnishes and plastic tubing

STANDARD OF THE WORLD

IRVINGTON INSULATION

TRADE MARK

IRVINGTON, NEW JERSEY, U. S. A.

Plants at IRVINGTON, N.J.; HAMILTON, ONT., CAN.

Representatives in 20 Principal Cities

Voltage with a Vengeance

BACK of almost every machine that is humming in America's war plants is the unseen powerful force that makes it hum... ELECTRICITY!

But how did we get all of this power, so suddenly and so quickly? For America's power demands pyramided almost overnight... and there wasn't always enough extra generating capacity lying around idle in the spots where it was needed. There's where the American power companies performed a miracle, throwing into the job their ready-and-waiting plans of inter-connection of systems, and expansion. And presto, there was the voltage... with a vengeance.

But existing power transmission lines could not hope to carry the additional load. Here again, additional wires and cables were reared to the skies across the land, reaching war plants in the widely scattered areas, many of them remotely located. For every war-plant machine, when installed, must find its power ready and waiting, wired in and ready for use.

It speaks well for the teamwork of the American Electrical Industry that each machine DID find the voltage waiting... with a vengeance.

It's the American way of doing things. Teamwork. Washington analyzed the needs, guided and coordinated the tremendous enthusiasm which the Industry put into the task. Much of the credit goes, too, to the men in the ranks, the skilled labor, the electricians, the contractors... for today the working man's clothes are as much a badge of all-out patriotic effort as the uniform of the soldier.

In a war of armament production, it is power that plays an all-important part. And America has the power... electrical power... "voltage with a vengeance."

GENERAL CABLE CORPORATION

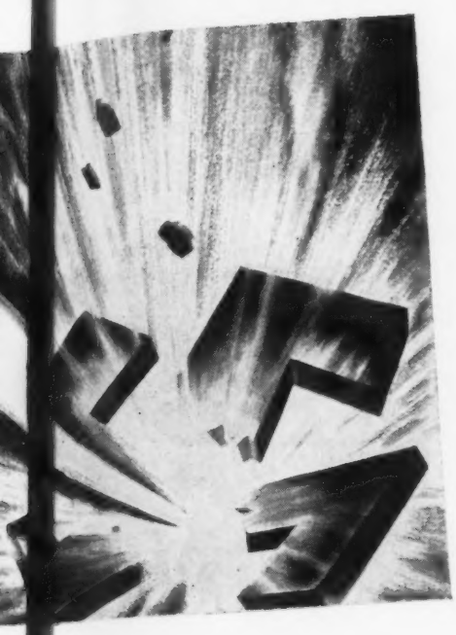
Manufacturing Plants from Coast to Coast

ARMY E NAVY

BARE AND INSULATED WIRES AND CABLES FOR EVERY E

PRINT IN BINDING

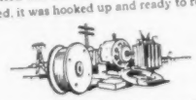
T NEEDED THIS TELLING...



The Electrical Industry Will Keep the War Plants Powered to Produce

Its Electrical Contractors, and the skilled Electricians in Industry's employ, will tackle the electrical maintenance job with the same patriotic eagerness they put into getting the plants built.

Before the walls were complete or the roofs put on the new plants, the electrical workers had swarmed on the jobs, run in the feeder cables, installed the wiring. As soon as machinery arrived, it was hooked up and ready to roll.



Electricians did their bit—with a vengeance. So did the Electrical Supply Houses, everywhere.

☆ ☆ ☆

Suppose 'twas Tenakee, Arizona. Right there was an Electrical Supply House and its warehouse stocks of a thousand electrical items. 'Twas just like having a hundred or two electrical manufacturers just around the corner. And the electrical contractor who installed the material has just as complete service in Tenakee as he would in Philadelphia, Cleveland or anywhere else.

☆ ☆ ☆

And so it will be in the continuing job of keeping the plants going. Any plant, anywhere, is just a few miles from an established Electrical Wholesaler. It is from his stocks that emergency needs will be filled, and the machinery kept busy at its vital war tasks.

RY ELECTRICAL PURPOSE

This Advertisement **reproduced herewith speaks for itself. It is published on behalf of the Industry of which you and we both are a part. It is one of a series by which General Cable hopes to bring home to the public a better realization of the importance of the Electric Light and Power Industry in the American scheme of things.**

☆

Scheduled appearances include the Washington Post, New York Times, Chicago News, San Francisco Chronicle, Los Angeles Times, St. Louis Post Dispatch, Dallas News, Saturday Evening Post, Time Magazine and Business Week.

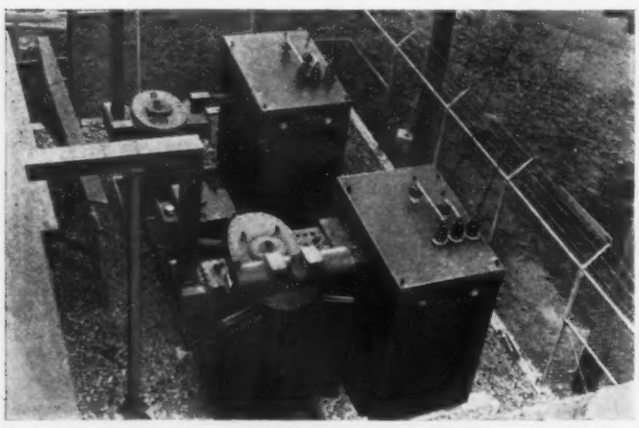
General Cable Corporation Sales Offices are located at Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Houston, Kansas City (Mo.), Los Angeles, New York, Philadelphia, Pittsburgh, Rome (N.Y.), St. Louis, San Francisco, Seattle, Washington (D. C.)

Save Copper *and get*

SHORTER DELIVERIES

FASTER INSTALLATION

INCREASED PRODUCTION



IN A WESTERN ORDNANCE PLANT, ALLIS-Chalmers Unit Substations, like these, serve isolated buildings . . . permit better motor and lamp performance because losses are reduced, regulation improved.

Modern, Packaged Allis-Chalmers Standard Load Center Unit Substations Help Speed Industrial Expansion and Conversion . . . Save Valuable Floor Space . . . Improve Motor and Lamp Performance!

More power in a hurry! That's the first step in today's battle of production . . . and one that the new Allis-Chalmers Standard Load Center Unit Substation helps you take.

For these modern units can be delivered faster. There's no delay on the drafting board for "special" designs . . . no time lost at plant

WE WORK FOR VICTORY WE PLAN FOR PEACE

ALLIS-CHALMERS

and Steel

STANDARD ALLIS-Chalmers Load Center Unit Substation for a midwest armament plant. Transformer has oil fuse cutout on the high side, stationary air break switchgear — electrically or manually operated — on the low side.

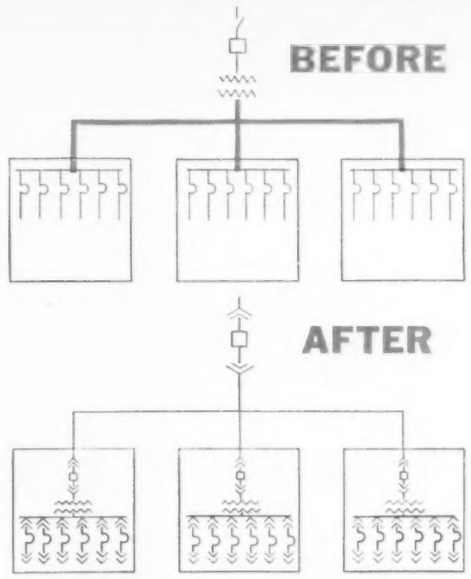
sites for building special vaults or complicated field wiring. All you have to do is set these factory-assembled units in place . . . connect the leads . . . and you're ready to produce.

And once they're on the line, production is stepped up! Because they can be installed right at your load centers, long runs of heavy secondary cable are eliminated. Losses are lower . . . regulation improved . . . motors and lamps perform better. Important, too, you save copper and steel for the War Program.

If conversion or expansion is necessary, Load Center Unit Substations can be shifted to new load centers quickly and easily . . . installed in any available unused floor space. They're completely flexible . . . with a wide variety of high and low side connections possible.

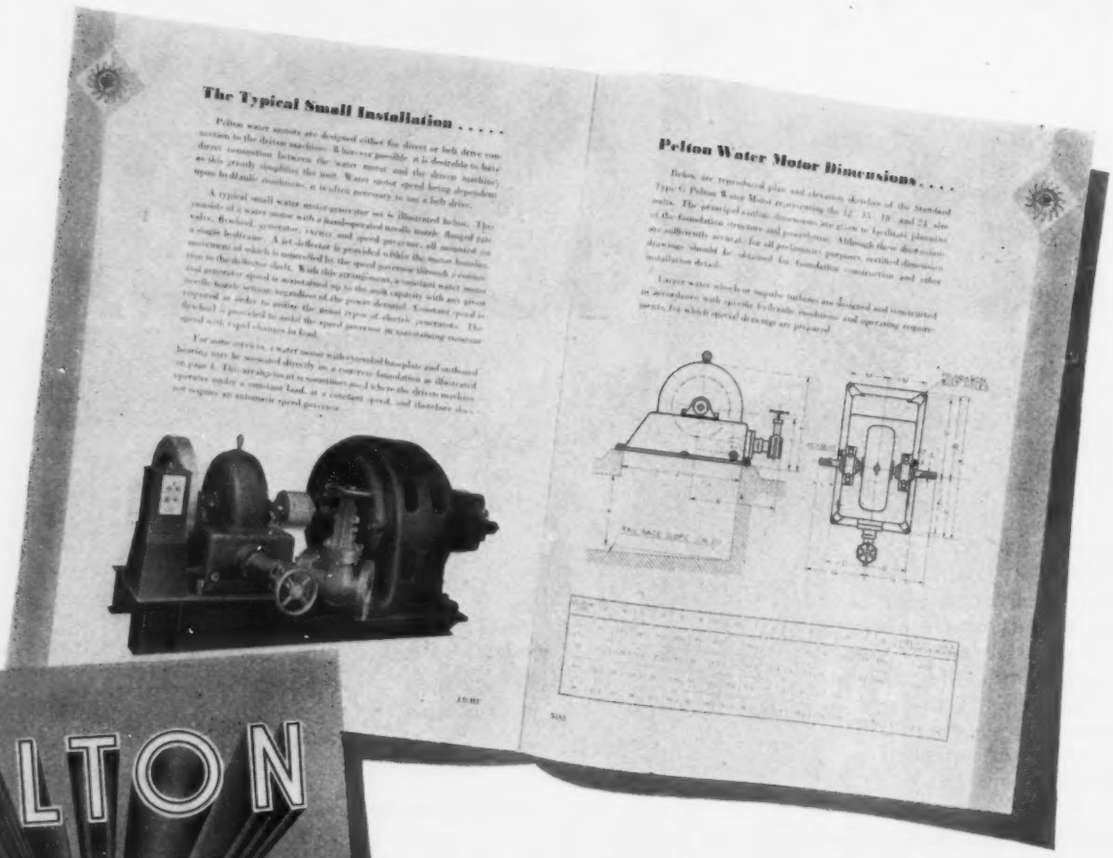
Shorter Deliveries! Faster Installation! Increased Production! For complete information on Allis-Chalmers Standard Load Center Unit Substations, call the district office near you. Or write to Allis-Chalmers, Milwaukee, Wis.

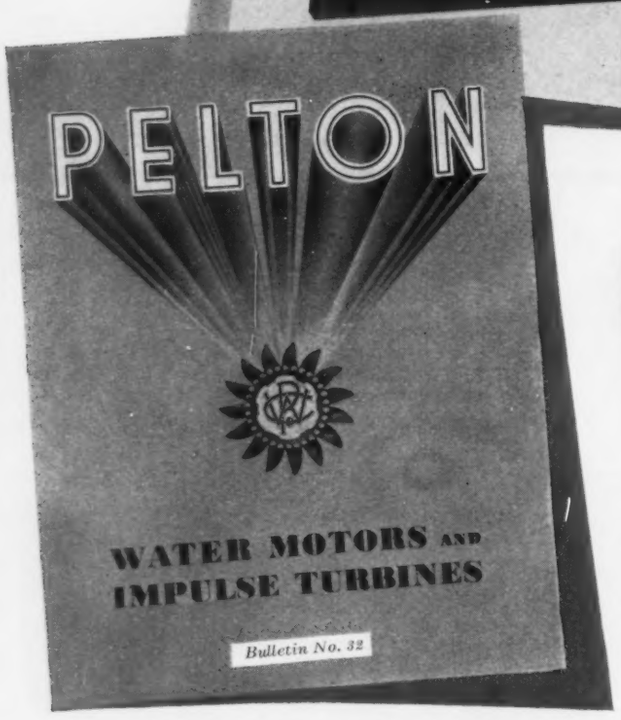
A-1546



LOAD CENTER UNIT SUBSTATIONS ELIMinate long runs of heavy secondary, reduce losses, save copper and steel for the Victory Effort. The heavy copper (in red) on this single line diagram of a small plant's old style distribution system is unnecessary with load center planning.

UNIT SUBSTATIONS





If you do not already have a copy of Bulletin No. 32 please write to us.

ENGINEERS!

There's Data for You in This Pelton Bulletin

Perhaps it's in your file, this Pelton Bulletin about Water Motors and Impulse Turbines.

It offers data in sizes from .04 H.P. to 5685 H.P. to help you plan for the present and for after-the-war developments. For ratings up to 70,000 H.P., we offer complete details upon your request.

Pelton Water Motors, Impulse- and Reaction-Type Turbines have won wide recognition throughout utility history for dependability and high efficiency.

THE PELTON WATER WHEEL COMPANY

Hydraulic Engineers

2929 NINETEENTH ST., SAN FRANCISCO

EXCLUSIVE REPRESENTATIVES for Baldwin-Southwark Division of Baldwin Locomotive Works, Baldwin-De La Vergne Sales Corp., Woodward Governor Co. and Cone Valve Division, Chapman Valve Mfg. Co.

120 Broadway NEW YORK

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BLW THE BALDWIN GROUP

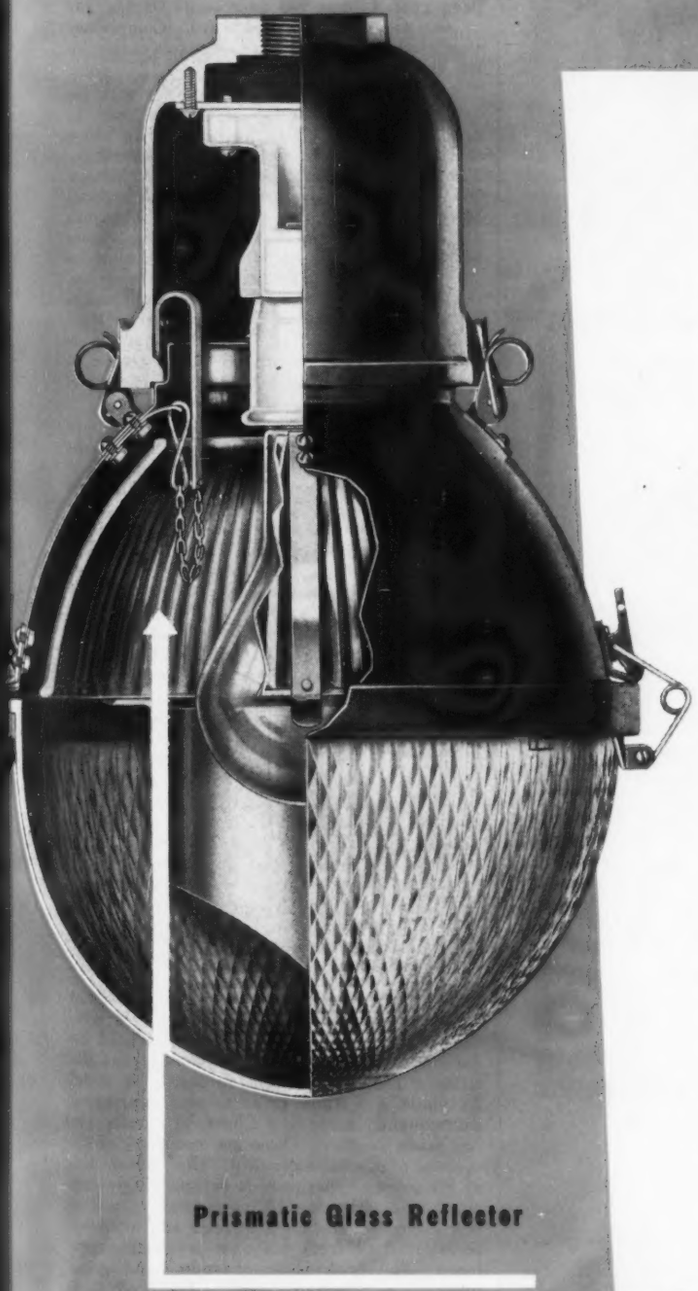
PELTON

Subsidiary of THE BALDWIN LOCOMOTIVE WORKS

For Every Type of Outdoor Lighting

...L-M Prismalite

The Most Modern and Versatile Outdoor Luminaire. Equally Efficient for Street, Highway and Industrial Property Lighting



Prismatic Glass Reflector

1 HIGH IN LIGHT OUTPUT

Due to the scientific design of the prismatic glass reflector, the L-M PRISMALITE has the high effective light output of a modern, concealed light-source luminaire.

2 PERMANENT IN EFFICIENCY

The PRISMALITE is the first street lighting luminaire with concealed light source that is permanent in its original high efficiency. Unlike metallic or silver-coated glass reflectors which in time decrease in reflecting qualities, the original high reflection factor of the glass prism reflector is permanent.

3 ECONOMICAL IN MAINTENANCE

Should the outer housing of the PRISMALITE become damaged, the reflector can easily be removed and used again in a new housing with its efficiency undiminished. Should the reflector be broken, the reflector only need be replaced. A strong steel housing protects the reflector.

Should cleaning become desirable, the prismatic glass reflector can be cleaned with plain soap and water while in its housing.

4 VERSATILE AND INTERCHANGEABLE

A clear glass globe for symmetric distribution is easily interchangeable with three types of refractors for asymmetric light distribution to meet changing installation needs.

A variety of interchangeable hoods and brackets are available for every mounting requirement.

5 SAVES CRITICAL MATERIAL

You help conserve vital material when you use the L-M PRISMALITE. With its clear glass prism reflector, the Prismalite requires no copper backing . . . glass alone does the job efficiently, permanently and economically.

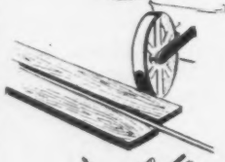
6 GET FULL INFORMATION

on the new Prismalite Luminaire for every type of outdoor lighting by requesting Bulletin No. 4131 or Bulletin No. 4231 on Protective Lighting. Just send your request to Line Material Company, 802 No. 8th Street, Milwaukee, Wis.

LINE MATERIAL COMPANY

GET LONGER LIFE from your rubber-sheathed cords and cables by protecting as far as possible against conditions that accelerate failure ... by unusual care in use, repairing promptly and properly.

1 SUN AND HEAT Avoid as far as possible exposure to direct sun rays, or high temperature from outside, or from overloading.



2 ABRASION AND KINKING Use guards such as planking or piping where possible, and operate to avoid kinking. In operating reels, use the largest practical size drum.

3 OIL AND GREASE Wipe off regularly and clean with a washing soda solution. Remove from oil exposure as soon as possible.

4 OVERLOADING Check *actual* load against rating; also fuses and circuit breaker contacts. Correct temporary wiring as soon as possible.

TO REPAIR, tape all nicks and cuts immediately and shellac the taped areas. Trim back broken sheath, tape and *patch vulcanize* whenever possible.

IDEAS ARE AMMUNITION... *Why not share yours?*

Your operating or maintenance ideas for extending the life of electric wires and cables are solicited—please send them in. We'll pass them along to many others working to speed Victory.

JAR ROEBLING

ROEBLING

JOHN A. ROEBLING'S SONS COMPANY OF CALIFORNIA

San Francisco • Los Angeles • Seattle • Portland

BOOKS

you may want

ALTERNATING-CURRENT MACHINES, by A. F. Puchstein and T. C. Lloyd. 655 pp. John Wiley & Sons, Inc., N. Y., second edition, $5.50. This second edition has resulted in polishing up an already very fine book which is not only an excellent text for the college classroom but also a valuable reference to the practising engineer. The text has been enlarged by the addition of some 75 pages of new material. The placement of figures and diagrams has been greatly improved as regards relationship to the associated printed word. Comprehension of the text is thus made much easier for the reader.

For the benefit of those unfamiliar with the first edition, the outline of topics may be briefly stated as follows, in the order in which they are presented: Synchronous Generators, Transformers, Polyphase Induction Motors, Single-Phase Induction Motors, Synchronous Motors, Alternators in Parallel, Synchronous Converters, Mercury-Vapor Rectifiers, Series Motors and Repulsion Motors. Each of these subjects is treated from several angles: types, construction, design features, technical calculations, testing and operating characteristics. The application of technical calculations is illustrated throughout the book by means of typical examples worked out to a numerical result.

As compared to the first edition there have been numerous additions to the text based upon the more recent standardization rules as adopted by the National Electrical Manufacturers Assn., the American Institute of Electrical Engineers, and the American Standards Assn. Calculations for generator performance have been rewritten. The chapter on the Cross-Field Theory of Single-Phase Induction Motors has been completely rewritten and very much amplified. Examples and calculations procedure assist in illustrating the practical application. A complete new chapter on Capacitor Motors has been added.

The value of the book cannot be conveyed by a simple recital of the subjects covered. Rather, the striking point about the book is, as already intimated, the broad coverage of the various classes of alternating-current machines from both the technical and application points of view. The style and arrangement make for readability and easy comprehension and the book is suitable for either text or reference. It is heartily recommended.—E.A.C.

★

TALES OF A PEDDLER by Ernest Ingold, published by the author, 999 Van Ness Ave., San Francisco, price $1.00. Ernest Ingold became known to the electrical industry as distributor for Atwater-Kent radios, with which he made a fortune prior to the depression. Subsequently he took a Chevrolet agency and has made another. These are measures of the success of his salesmanship. The human side of his selling experience is entertainingly capsuled in a charming 142-page book of selling reminiscences, stories, anecdotes and keen observations, all from his own personal experience. The book is as charming and good-humored as the man himself. The book is so rich in human interest, in fact, that to begin it is to continue reading until it is finished. In the process, a good deal of sound sales wisdom, observation of human nature, and interesting information about people and places passes by.

BULLDOG BUSTRIBUTION DUCT AND TROL-E-DUCT

Plug in for Power and Light at any Desired Point

HERE is a splendid example of how parallel runs of BullDog BUStribution DUCT, *for power*, and Universal Trol-E-Duct, *for lighting*, take all the guesswork out of electrical distribution to specific production line locations.

Each machine is served with power through an individual protective plug — each light is separately fused, and instantly movable. Yet the whole line, including the BullDog equipment, can be rearranged or moved altogether with a minimum of lost time and maintenance cost.

Conversion from peace to war manufacturing, from one armament job to another, or back to peacetime manufacturing later on — all are equally quick and easy with the completely flexible, 100% salvable, prefabricated BullDog equipment.

BullDog pioneered Bus Duct Systems—and sets the pace for the field. Its engineering laboratory leads the way in improvements to increase efficiency and conserve critical materials, such as rubber, aluminum, etc.

To save time, why not let the BullDog Field Engineering Staff — men who have had years of experience in this field — submit complete electrical distribution layouts to your architect or your engineering department. Write today for complete descriptive bulletins.

BULLDOG
ELECTRIC PRODUCTS CO.
DETROIT, MICHIGAN
BullDog Electric Products of Canada, Ltd., Toronto, Ontario

Layouts and Estimates Furnished by the following Pacific Coast Representatives:

Mullenbach Electrical Mfg. Co.
2300 East 27th St.
LOS ANGELES

Safety Switchboard & Mfg. Co.
1445 Stevenson St.
SAN FRANCISCO

Coast Electric & Mfg. Co.
1720 N.E. Sixth Ave.
PORTLAND

MANUFACTURERS of Vacu-Break Safety Switches, SafToFuse Panelboards, Circuit Master Breakers, Switchboards, Bus Duct Systems—FOR LIGHT AND POWER

ELECTROMASTER DATA SHEET No. 1

ELECTROMASTER

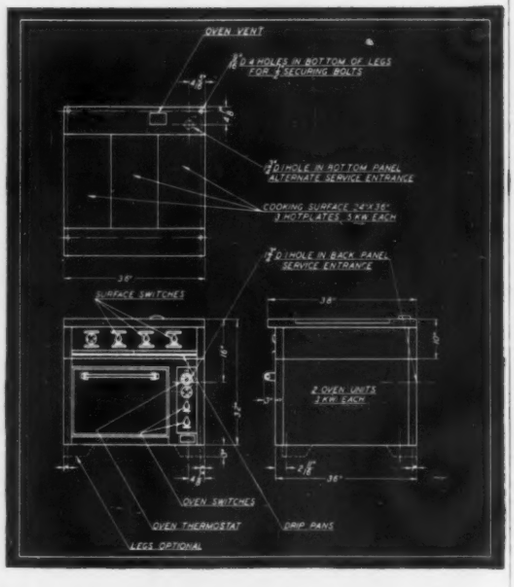
"Ranger"

ONE OF A COMPLETE LINE OF HEAVY DUTY ELECTRIC RANGES FOR WAR PLANTS, SHIPYARDS, OTHER ESSENTIAL INSTALLATIONS

Wherever new electric cooking equipment is installed, on land or at sea, Electromaster's advice to "compare—and choose" meets with instant favor.

Specifications meet all official requirements. Pioneer in the straight-line method of electric range production, Electromaster offers you the cleanliness and efficiency of electric cooking at a truly sensible price.

The "Ranger," Model H 301-4 (with backshelf).


OVEN VENT
4 HOLES IN BOTTOM OF LEGS FOR 4 SECURING BOLTS
HOLE IN BOTTOM PANEL ALTERNATE SERVICE ENTRANCE
COOKING SURFACE 24"X36" 3 HOTPLATES, 5 KW EACH
HOLE IN BACK PANEL SERVICE ENTRANCE
38"
SURFACE SWITCHES
2 OVEN UNITS 3 KW EACH
OVEN SWITCHES
OVEN THERMOSTAT
DRIP PANS
LEGS OPTIONAL

ARMY E NAVY

ELECTROMASTER INC.

ELECTROMASTER INC.
1807 E. Atwater, Detroit

• Send me full details on the Electromaster line of heavy duty electric cooking equipment.

NAME _____

ADDRESS _____

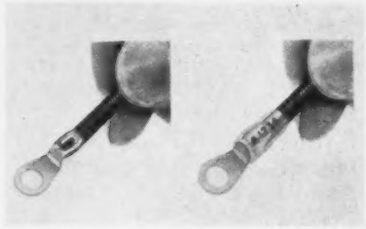
CITY _____ STATE _____

PRODUCTS

that are news

Hylug Terminal (1200)

Burndy Engineering Co., Inc., has developed a small wire terminal, the Hylug, for standard, aircraft and navy cable. Features claimed are compactness and lightness of weight. Many variations are available, according to the manufacturer, who states that installation is



effected by means of specially designed pliers or pneumatic Hypresses. Illustration shows (left) Hylug uninsulated and (right) Hylug with marked Versiflex insulating sleeve.

All-Spray Nozzle (1201)

American-LaFrance-Foamite Corp. has introduced a variable, all-spray nozzle which it claims will prevent the possibility of inadvertently applying a solid water stream on live electric circuits. Range is from a cone spray of 40° to full curtain of 150°, with reversal back to shut-off without intervening straight stream. Because of the volume of water this nozzle can handle and the wide area covered by its spray, it is said to offer excellent protection against fires spreading from incendiary bombs.

The nozzle is known as Model 10F, and can be furnished for any 2½ in. hose thread and for Underwriters' tip thread, 2 in. hose thread or 1½ in. thread. In the 40° spray position, the capacity is about 95 and 135 gpm. at 50 and 100 lb. inlet water pressures respectively. Full curtain capacity at these pressures is approximately 170 and 215 gpm.

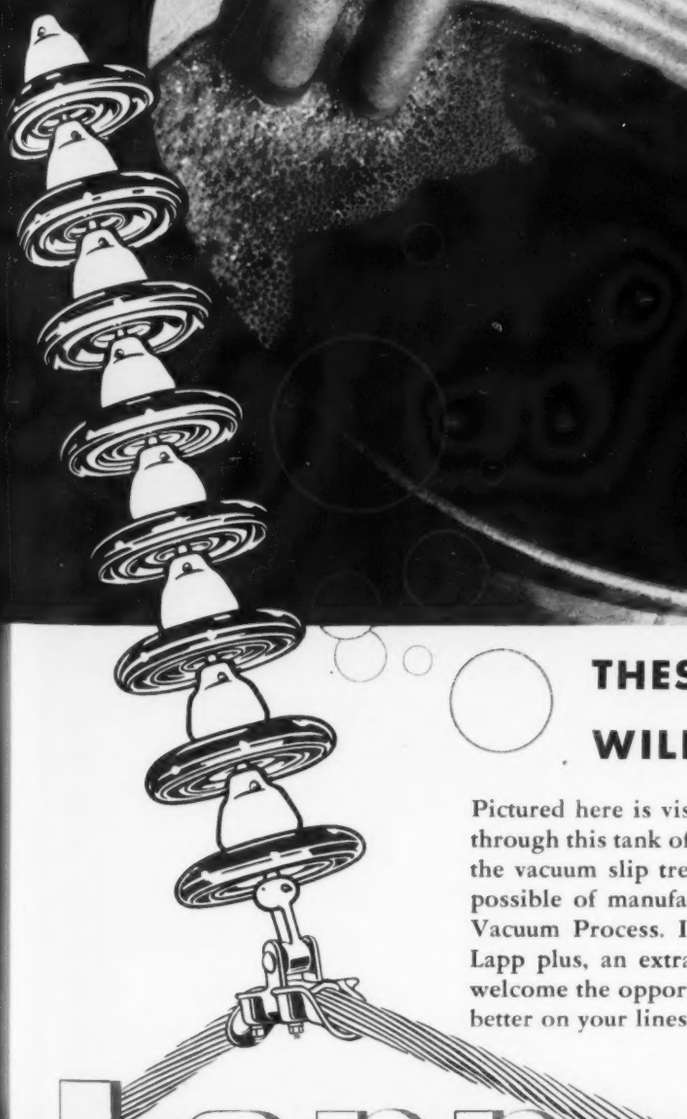
Novalux Controller (1202)

A new Novalux controller which assures increased protection against electrical breakdown on high-voltage circuits has been developed by General Electric Co. This solenoid-operated oil switch is for use with constant current transformers energized from distribution systems up to 7,620 volts and has 15-kv class insulation as specified by ASA Insulation Standards. It was designed primarily for use on protective lighting circuits served from distribution systems operating at voltages up to 7,620/13,200 Y.

Multiple Lamp Ballasts (1203)

Additions to the Jefferson Electric Co. line are two new lamp ballasts—No. 234-983 for operating three 40-watt lamps and No. 234-982 for four 100-watt lamps. According to the manufacturer, these multiple lamp ballasts conserve critical materials; reduce installation time and power consumption. The new four-lamp ballast is designed for operation on line voltages ranging from 250-280 volts and is applicable to circuits in the 265/460-volt Y class.

IT'S THE *PORCELAIN* THAT INSULATES

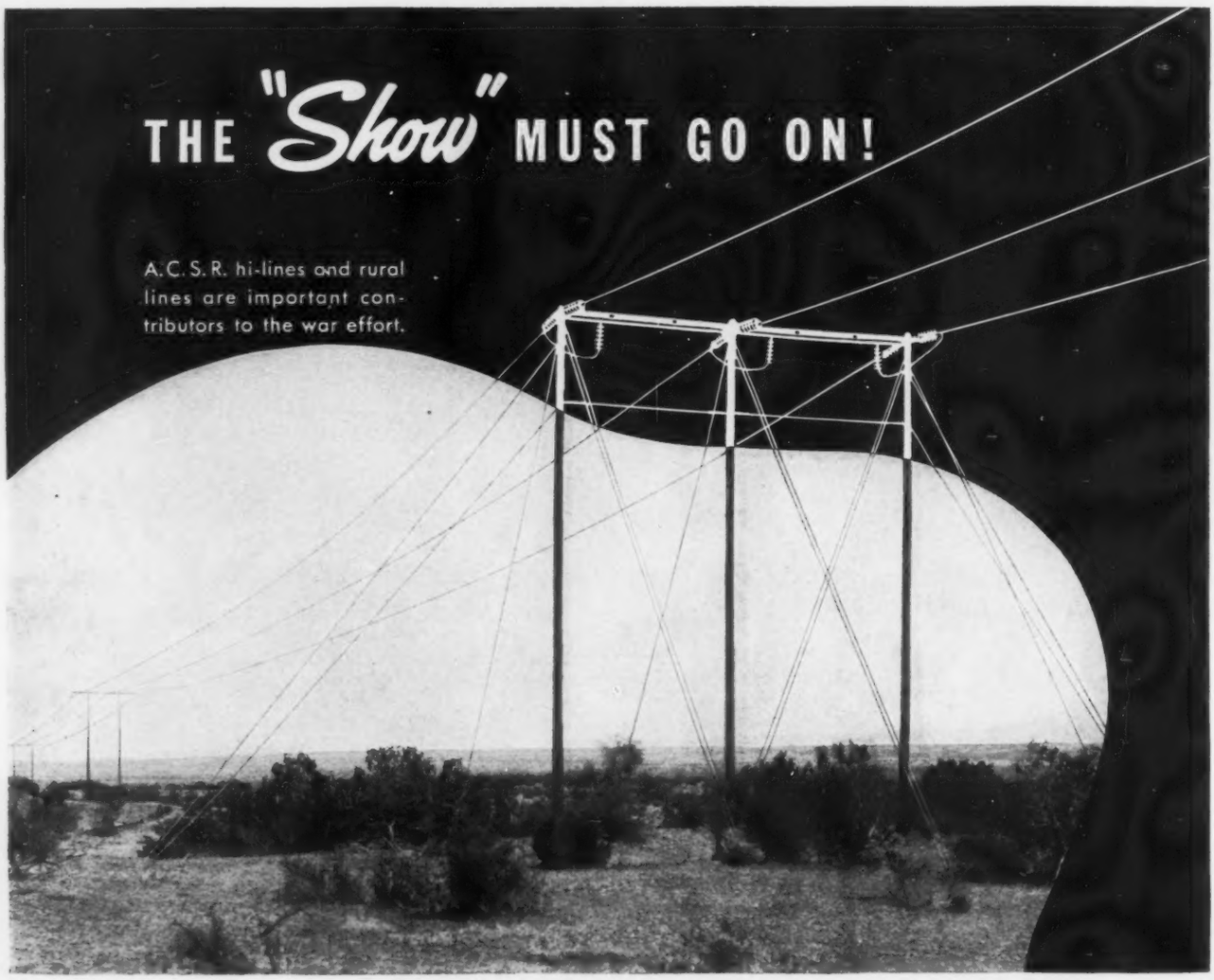


THESE AIR BUBBLES WILL NEVER SPOIL AN INSULATOR

Pictured here is visible evidence that Lapp Vacuum Process does its job. Bubbling through this tank of water is the air expelled from the liquid clay, as it passes through the vacuum slip treatment. Many of the porcelains in routine Lapp production are possible of manufacture only because of the superior quality of clay produced by Vacuum Process. In conventional types of insulators this superior porcelain is a Lapp plus, an extra factor guaranteeing mechanical and electrical integrity. We'll welcome the opportunity to tell you just why we think Lapp Insulators will perform better on your lines. Lapp Insulator Co., Inc., Le Roy, N. Y.

Lapp

Better Porcelain • Better Insulators



What better rallying-cry could you find for the men who are maintaining your power lines? Hi-lines carrying power to vital war industries, and farm lines feeding the rural production front, all must be kept on their mettle.

Take the Government's word for it, the country's power lines have got to be equal to the tremendous responsibility being placed on them. This requires proper maintenance, and that means the right materials correctly installed. Ruling P-46 permits you to obtain these materials.

There are places, of course, where substitute materials and methods can keep power lines going "for the duration", without drawing on the limited supply of essentials. Alcoa engineers may be able to suggest such substitutes and can assist in developing your ideas.

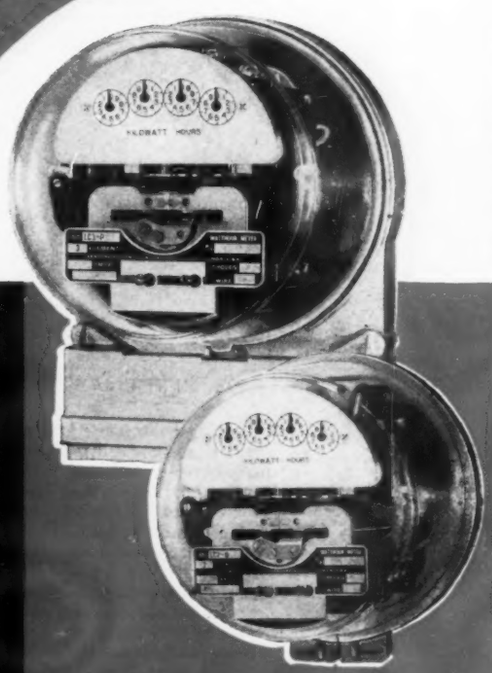
Alcoa engineers are always available to advise you on methods of getting the most work out of your A. C. S. R. lines. Write ALUMINUM COMPANY OF AMERICA, 2132 Gulf Building, Pittsburgh, Pennsylvania.

ALCOA ALUMINUM A.C.S.R.

A·C·S·R *Aluminum Cable Steel Reinforced*

ON RURAL POWER LINES AND HI-LINES

WAR BONDS MAKE
UNCLE SAM MORE
POWER-*full*



"On Measurement is founded the whole progress of man.."

Wouldn't amusement change to amazement if this should happen to you? Suppose, as you were coming from church on a Sunday morning, someone should pull you aside and align you with fifteen other men so that all left feet were in line, one behind the other. Then, when he was all through, he would announce with great dignity: "This is the right and lawful rood (rod) with which I shall survey your land." That happened in Germany in the 16th century. This was the conception of standardization. Compare it with today's high standard of measurement of electricity set and met by the electric utilities and the manufacturers of watthour meters.

NO OTHER COMMODITY IS MEASURED SO *Accurately* AS ELECTRIC POWER

SANGAMO ELECTRIC COMPANY SPRINGFIELD ILLINOIS

War Time Speed!

HERE'S ONE ANSWER—

KLEIN'S

● Serving telephone and telegraph lines carrying wartime messages—keeping power flowing to important industrial plants—helping speed freight and passengers on transportation systems—these are all jobs on which Klein tools are proving that under the strain of unusual conditions, quality counts.

Because war needs have first call on manufacturing facilities, owners of Klein tools and equipment are fortunate in possessing equipment that is designed to last longer because it is made better.

ASK YOUR SUPPLIER

Foreign Distributor: International Standard Electric Corp., New York

Mathias KLEIN & Sons

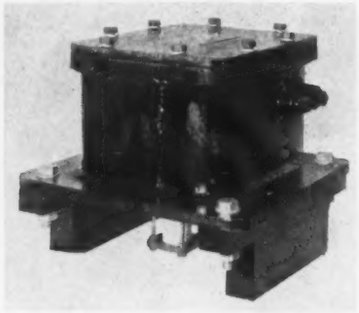
Established 1857 — Chicago, Ill., U.S.A.

3200 BELMONT AVENUE, CHICAGO

HCL Detector (1204)

An HCL detector for Inerteen transformers is being manufactured by Westinghouse Electric & Mfg. Co. Claiming that the device is more sensitive and faster in operation than conventional pressure release devices, the manufacturer states that it will give prompt warning of even very small arcs by detecting the presence of HCL gas formed by the decomposition of the liquid.

This detector is said to operate in approximately 85 sec. from a 1 kva. arc when pressure might still be less than 2 lb. per sq. in. It can be used to operate an alarm or to operate the circuit breaker, thus disconnecting the transformer from the feeder.



Porcelain Fixtures (1205)

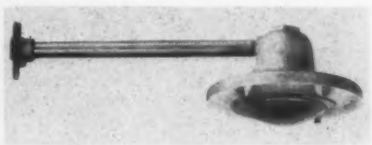
Pass & Seymour, Inc. is offering new Alabax porcelain lighting fixtures. The line includes side-wall brackets with night light; enclosing bowl type; and a model with two keyless sockets, one for the principal light, which can be any size up to 300 watts, and one for subdued illumination. For blackout purposes the small lamps may be types approved by the War Department, the manufacturer points out.

Blackout Luminaire (1206)

Redesigned to meet revised specifications, General Electric Co's blackout street luminaire is said to provide a lighting intensity equivalent to one-fiftieth of the illumination of a full moon.

The unit is built without glass to eliminate danger of breakage during an air raid. Light is supplied by a 9-watt long-life lamp placed in a plastic band.

These luminaires are designed mainly for



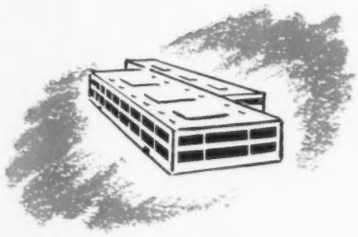
use in areas where blackouts may hold up war production, according to the manufacturer, and should be spaced from 100 to 150-ft. apart. It is stated that because of the low-wattage, long-life lamp employed, the unit can be operated 24-hours a day and be in service whenever the blackout alarm is sounded.

"Stick-To-Metal" Labels (1207)

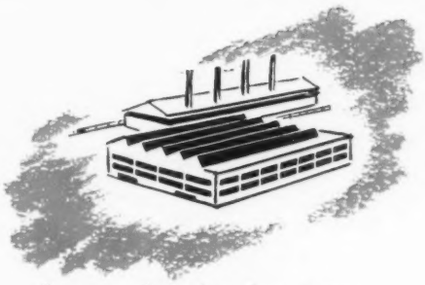
Ever Ready Label Corp. is making a special "stick-to-metal" gumming which can be applied to paper or linen fabric. The gummed labels will adhere to tools, products and machines.

SAVED --with Load-center Power Distribution

Tons of Copper and Steel
Weeks of Valuable Time



In an ordnance plant, 5 tons



In a manufacturing plant, 8 tons

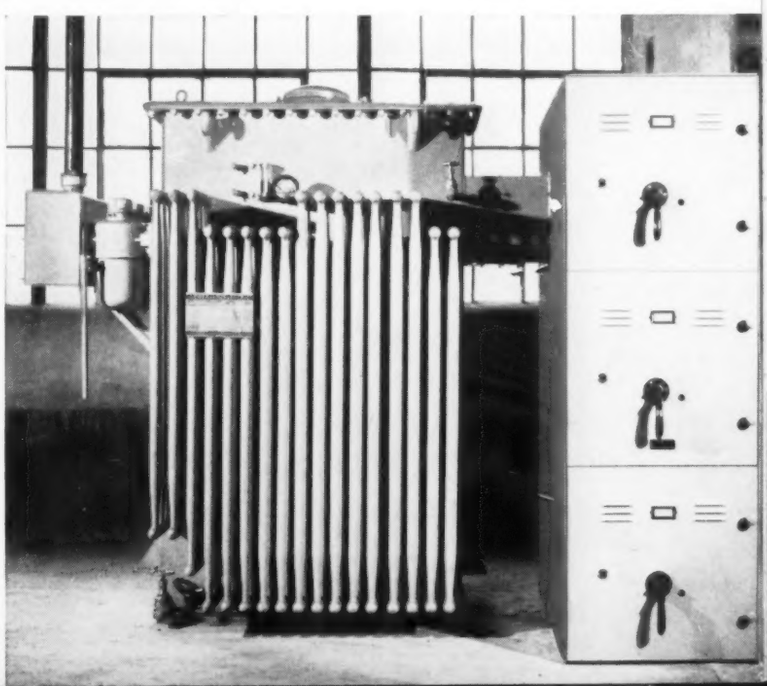
In a large shipyard, 145 tons

ON THESE three projects alone, load-center electric distribution systems, with their copper-stingy short secondaries, made possible the conservation of vast quantities of vital copper and steel. And the jobs were completed in *one to six months' less time* than would have been required if old-style systems had been used.

Using *standard,* "packaged" equipment, a load-center system presents very few design problems, can be purchased and installed much more easily and quickly, and at *lower* over-all cost. Performance of electric equipment is materially improved by the reduction of voltage drop in the *short* low-voltage feeders. Write for more detailed information. *General Electric Co., Schenectady, N. Y.*

LIGHTING MATERIALS, TOO!

Load-center distribution is especially suitable for fluorescent lighting using General Electric's new Forlamp ballast, which operates within a range from 250 to 280 volts. This new ballast requires only about one-half as much copper, iron and steel, and aluminum as was required for the most economical ballast hook-up heretofore available for operating four 100-watt lamps.



The Navy "E", for Excellence, has been awarded to 92,780 General Electric employees in six plants manufacturing naval equipment

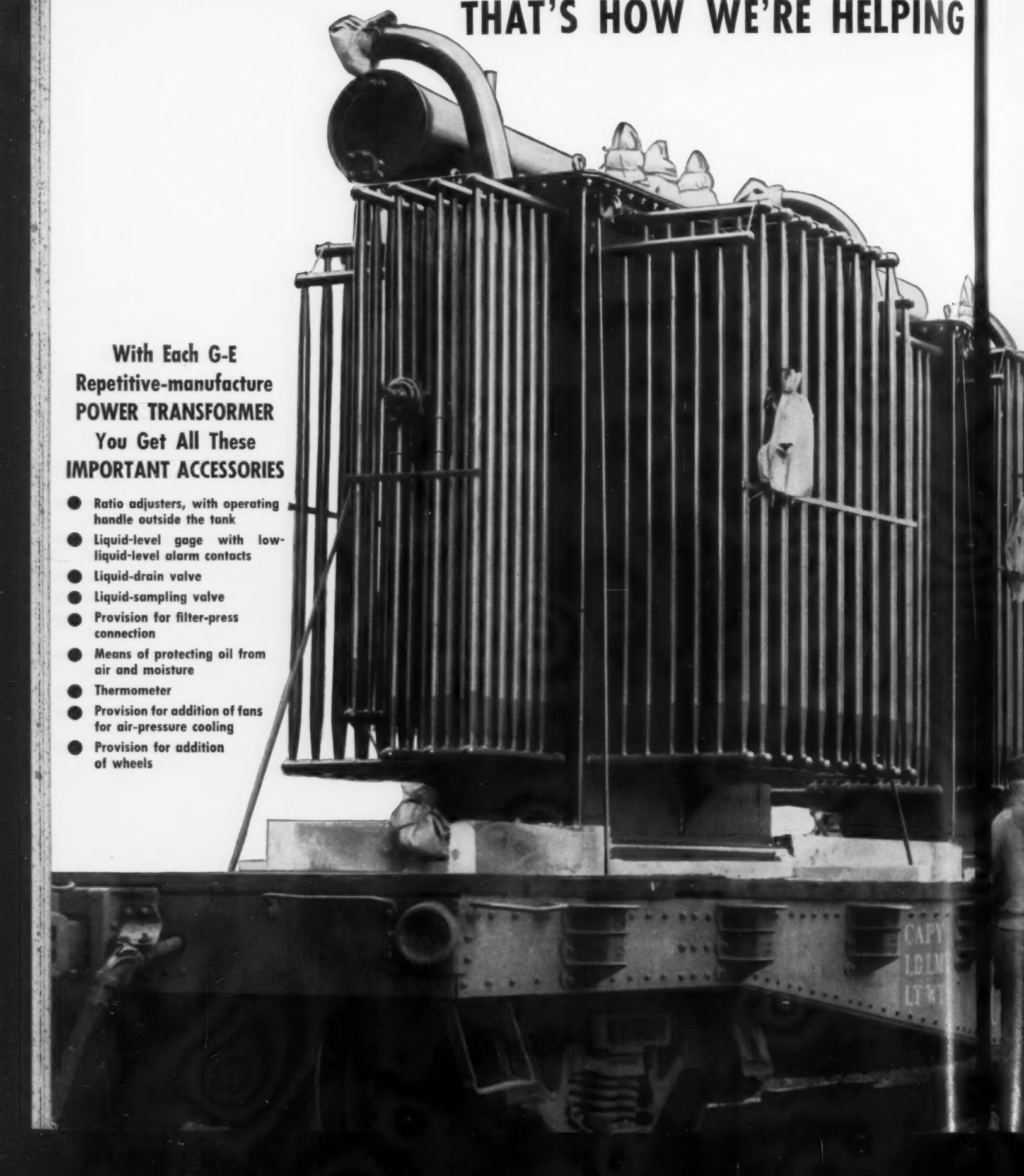
In the load-center system, power is distributed at relatively high voltage (2.4 to 13.2 kv) to compact unit substations located near the centers of electrical load areas—eliminating the need for long, heavy, low-voltage feeders from a distant substation. These factory-assembled, safety-metal-enclosed units are quickly and easily installed right in working areas without expensive vault construction—thanks to non-inflammable Pyranol.

GENERAL ELECTRIC

802-18-170E

WE BUILD A LOT OF T

THAT'S HOW WE'RE HELPING



With Each G-E Repetitive-manufacture POWER TRANSFORMER You Get All These IMPORTANT ACCESSORIES

- Ratio adjusters, with operating handle outside the tank
- Liquid-level gage with low-liquid-level alarm contacts
- Liquid-drain valve
- Liquid-sampling valve
- Provision for filter-press connection
- Means of protecting oil from air and moisture
- Thermometer
- Provision for addition of fans for air-pressure cooling
- Provision for addition of wheels

THEM ALIKE . . .

YOU KEEP DOWN CAPITAL INVESTMENT

ONE way to get more goods for more people at less cost—and it's just as true of transformers as of lamps—is to build a lot of them alike. That is just what we have initiated and are doing in the field of large transformers. The savings in man-hours and materials are immediate. They are being passed on to the purchaser in the form of lower prices, or—if you will—a lower capital investment.

General Electric now offers, in a wide range of ratings, *repetitive-manufacture* power transformers that not only suit the majority of applications, but also effect appreciable savings in the purchase price as compared with transformers only slightly special.

G-E repetitive-manufacture power transformers are available in various ratings up to 5000 kva single-phase, and 7500 kva three-phase, with the normally used combinations of low-voltage and high-voltage ratings, as high as 69,000 volts. They are equipped with voltage taps and accessories in accordance with accepted practice as shown on the opposite page. *General Electric, Schenectady, N. Y.*

On the way to help make 100-octane gasoline — 10 three-phase, 2000-kva G-E power transformers, every one alike.

The Navy "E", for Excellence, has been awarded to 92,780 General Electric employees in six plants manufacturing naval equipment.

GENERAL ELECTRIC

HOW TO CONSERVE COPPER

IN CABLE SYSTEMS FOR WAR-JOB PLANTS

Use HIGHER VOLTAGE

WHEN you are planning expansion of an electric distribution system, or revamping plant wiring, there is an opportunity to save copper (compared with previous practice) by using as high voltage as you can. For example, cable at 480 volts requires only 26 per cent of the copper required for distribution at 208 volts.

Other effective conservation measures, when planning plant distribution for war production, are (1) use a high-temperature insulation because temperature limits of the insulation govern the permissible copper size; (2) use three-conductor instead of single-conductor cable wherever voltage regulation is the deciding factor, because the reactance drop in a three-conductor cable is less.

HOW MUCH COPPER CAN YOU SAVE?—Ask Us

In practically every case there can be a choice between two or more cables to do a job well. One, however, may permit a saving in copper—and will also conserve other vital materials.

Let us help you determine the cables that will do the job successfully and that will also conserve copper. General Electric cable engineers, both in your section of the country and at the factory, offer their services in figuring for you, or with you, just what the opportunities are.

When you save copper in the cable, you conserve copper in that part of the plant electrical distribution system where the copper requirements are the heaviest. For additional information, just ask the nearest G-E office, or write to General Electric, Schenectady, N. Y.

NOT THIS

500,000 cir mils—conductor size for *208 volts*

4.6 LB COPPER PER FOOT

BUT THIS

2/0 Awg—conductor size for *480 volts*

ONLY 1.2 LB PER FOOT

GENERAL ELECTRIC

501-15-1200

ILLINOIS

HIGH TENSION *Gooseneck* PORCELAINS

for TRANSFORMER ENTRANCE WIRES . .

• Accuracy in control of production of ILLINOIS Porcelain assures exact dimensions plus high mechanical and high dielectric strength for perfectly balanced insulators. All sizes and shapes are available for high tension transformers of every type—ease of installation assured because of uniformity — right fit means dependable service.

ILLINOIS ELECTRIC PORCELAIN CO. *Macomb, Illinois*

RUBBER COVERED POWER CABLES • BUILDING WIRE

CRESFLEX NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • MAGNET WIRE • BARE WIRE

VARNISHED CAMBRIC • FLEXIBLE CORDS • LEAD ENCASED AND PARKWAY CABLES • ARMORED CABLE

EVERY MAN, WOMAN & MACHINE
at
CRESCENT

is working 100% to keep the
Light of Freedom burning

CRESCENT INSULATED WIRE & CABLE CO.

CRESCENT
WIRE and CABLE
Factory: TRENTON, N. J.—*Stocks in Principal Cities*

LOS ANGELES
Tri-State Supply Corp.
544 S. San Pedro St.

SAN FRANCISCO
Tri-State Supply Corp.
554 Bryant St.

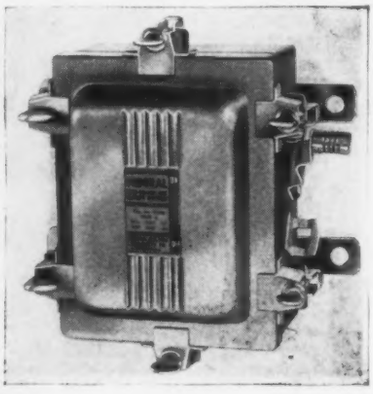
KANSAS CITY
W. F. Howe & Co.,
2627 McGee St.

CRESCENT ENDURITE SUPER - AGING INSULATION

Safety Switch (1208)

A new weatherproof and dust-tight heavy duty safety switch has been developed by Federal Electric Products Co. and is available from 30 to 1,200-amp capacity.

Employing a heavy rubber gasket plus a cover-within-cover, with box corners gas welded inside and out, this switch assures complete waterproof protection, the manufacturer states. It is closed by a simple eye-bolt and wing-nut arrangement incorporating an exclusive clamping design, which protects the rubber gasket from excessive pressure caused by forcing the wing nuts too tight and permits



closing sufficiently tight to insure complete protection against water, dust and lint.

The switch is recommended by the manufacturer for use where efficient operation of regular switches is hampered by dust or lint or where climate might upset normal operation.

Vitrohm Strip Resistors (1209)

Ward Leonard Electric Co. has announced Vitrohm strip resistors which it claims are particularly suited to applications in aviation, radio and installations where space limitations and high unit space watt ratings are important.

These resistors employ a strong, flat refractory core for the resistance wire winding. Terminals are mechanically banded and spot welded in position on the core, and the core and winding are then sealed in a fused-on Vitrohm enamel. Each unit is fitted with a self-sustained mounting bracket and spacer.

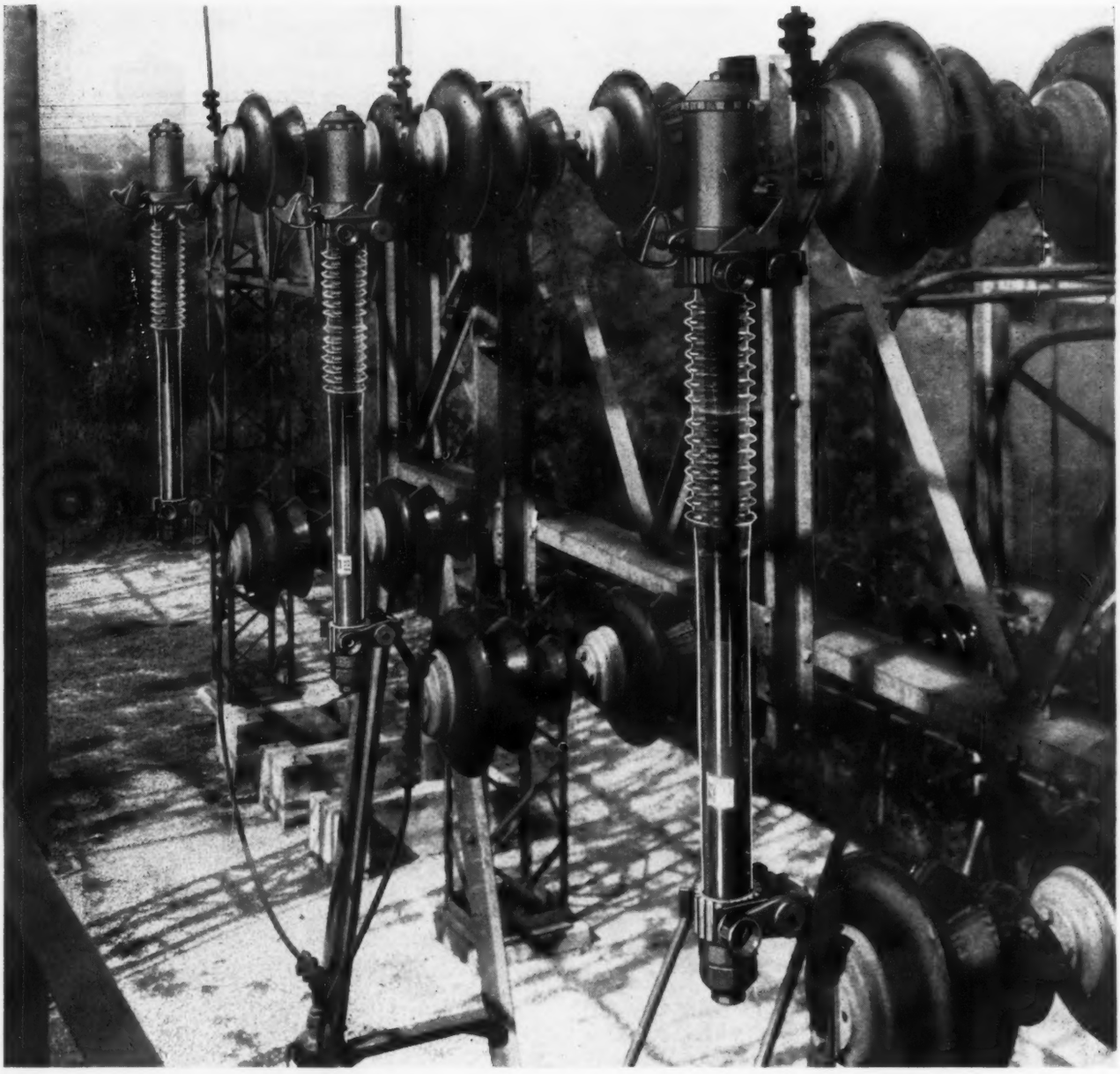
Available sizes range from 1½ to 6 in. in length, with ratings of 30 to 75 watts.

Pole Wire Lift (1210)

A. B. Chance Co. has developed a pole wire lift attachment for wires, limbs, rope or other object, that must be moved at a considerable height from the ground. It is a claw-like arrangement that is secured in the end of a safety pike pole. The tool is recommended by the manufacturer for lifting telephone or service drops, telephone lines, limbs and other objects over the boom when the A frame of a line truck is in position and for lifting wire in, around and over limbs while stringing wire.

Transformers (1211)

Thermador Electrical Mfg. Co. has announced Thermatite-treated transformers which it claims constantly withstand extreme conditions of humidity and heat. Smaller units are manufactured for radio use in territories with extreme weather conditions.



BIG SAVINGS IN CRITICAL METALS

S&C FUSES PROVIDE SAFE DEPENDABLE PROTECTION FOR SUBSTATIONS UP TO 138KV RATING

Tons of critical metal, copper, steel, tin—are conserved by the use of S & C Power Fuses for system protection. They are protecting Substations for power companies, large ordnance and war production plants—up to 138KV.

S & C Type "SMG" Power Fuses have short-circuit interrupting ratings up to 1,000,000 KVA. They are not destroyed when they operate but are put back in service by replacing the Refill Unit in the Housing. Available in capacities of 1 to 400 amperes,—46,000 to 138,000 volts.

Use S & C Power Fuses for reliable protection, shorter delivery schedules, great savings in critical metals—speedier installation.

SCHWEITZER & CONRAD, INC.
4435 RAVENSWOOD AVE. CHICAGO, ILLINOIS

TYPE SMG POWER FUSES

WESTERN REPRESENTATIVES:

SAN FRANCISCO
George E. Honn, 420 Market Street

LOS ANGELES
Farnham & Cunningham, Edison Bldg.

SEATTLE
T. S. Wood, 220 Ninth Avenue, North

SALT LAKE CITY
Riter Engineering Co., Kearns Bldg.

The eyes of all America are upon the United States Treasury Roll of Honor appearing in the "Payroll Savings News." For copy write War Savings Staff, Treasury Department, Washington, D. C.

HOW TO "TOP THAT 10% BY NEW YEAR'S"

Out of the 13 labor-management conferences sponsored by the National Committee for Payroll Savings and conducted by the Treasury Department throughout the Nation has come this formula for reaching the 10% of gross payroll War Bond objective:

1. ***Decide to get 10%.***
   It has been the Treasury experience wherever management and labor have gotten together and decided the job could be done, the job was done.
2. ***Get a committee of labor and management to work out details for solicitation.***
   a. They, in turn, will appoint captain-leaders or chairmen who will be responsible for actual solicitation of no more than 10 workers.
   b. A card should be prepared for each and every worker with his name on it.
   c. An estimate should be made of the possible amount each worker can set aside so that an "over-all" of 10% is achieved. Some may not be able to set aside 10%, others can save more.
3. ***Set aside a date to start the drive.***
4. ***There should be little or no time between the announcement of the drive and the drive itself.***
   The drive should last not over 1 week.
5. The opening of the drive may be through a talk, a rally, or just a plain announcement in each department.
6. Schedule competition between departments; show progress charts daily.
7. Set as a goal the Treasury flag with a "T."

AS of today, more than 20,000 firms of all sizes have reached the "Honor Roll" goal of at least 10% of the gross payroll in War Bonds. This is a glorious testimony to the voluntary American way of facing emergencies.

But there is still more to be done. By January 1st, 1943, the Treasury hopes to raise participation from the present total of around 20,000,000 employees investing an average of 8% of earnings to over 30,000,000 investing an average of at least 10% of earnings in War Bonds.

You are urged to set your own sights accordingly and to do all in your power to start the new year on the Roll of Honor, to give War Bonds for bonuses, and to purchase up to the limit, both personally and as a company, of Series F and G Bonds. (Remember that the new limitation of purchases of F and G Bonds in any one calendar year has been increased from $50,000 to $100,000.)

TIME IS SHORT. Our country is counting on you to—

"TOP THAT 10% BY NEW YEAR'S"

EVERYBODY EVERY PAYDAY AT LEAST 10%

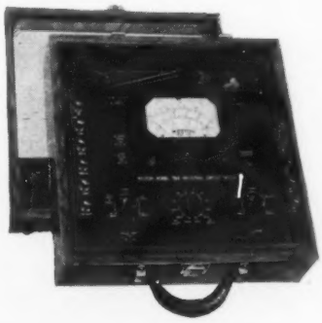
Save with

War Savings Bonds

This Space is a Contribution to America's All-Out Program by ELECTRICAL WEST

Weston *Model 633*
A-C CLAMP AMMETER

—a real *time-saver*, which tests without disturbing circuits or interrupting work. The clamping jaws are simply placed over the conductor or switch blade for current reading.

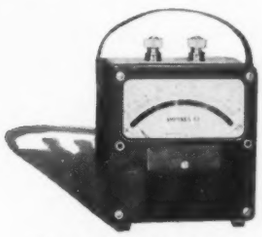


Weston *Model 785*
INDUSTRIAL CIRCUIT TESTER

A highly versatile tester for trouble shooting. Provides voltage, current and resistance ranges for checking motor and control circuits, lighting circuits, sensitive relay circuits, electronic circuits, etc. (D-C sensitivity 20,000 ohms per volt.)

Industry's production figures bear testimony to the outstanding contribution electrical contractors and plant maintenance men are making to war-plant efficiency. Despite obstacles such as materials scarcities and limited manpower, electrical equipment—old and new—is being kept constantly fit for full scale output.

As part of the efficient maintenance combat team the WESTON test instruments illustrated—and others—are playing an important role. For in addition to their *trustworthy indications* on which maintenance has long learned to depend—they also provide features which greatly simplify preventative maintenance procedure. *In less time—at far lower cost*—industry's electrical equipment is being kept *fit* with dependable WESTONS.



Weston *Model 430*
TEST INSTRUMENTS

The universal favorites for active maintenance . . . compact, rugged and with enduring precision. Large scale openings with hand calibrated mirror scales assure quick, accurate readings. Available in A-C and D-C instruments and single phase wattmeters.

Weston *Model 703*
DIRECT READING
ILLUMINATION METER

– measures all types of lighting direct, without correction factors—fluorescent, mercury vapor, incandescent, neon, daylight, etc. Made in models and ranges for shop and laboratory needs.

WESTON *Instruments*

Weston Electrical Instrument Corporation, 577 Frelinghuysen Ave., Newark, New Jersey

WESTERN REPRESENTATIVES

Seattle, Wash.
Eicher & Bratt
263 Colman Bldg.

San Francisco, Calif.
Herman E. Held,
420 Market St.

Los Angeles, Calif.
Edward S. Sievers,
417 So. Hill St.

Denver, Colo.
Howard Peterson,
1921 Blake St.

Phoenix, Ariz.
J. E. Redmond Co.,
448 W. Madison St.

2 WAYS to get clean-cut lettering and a permanent finish FOR DIALS AND PANELS

A "sandwich" type plastic-resin sheet in which lettering, calibrations and designs are engraved through the lustrous surface exposing the contrasting core. Clean-cut and permanent, nothing to wear off. Available with either black or white surface and with opaque or translucent back, for rear illumination.

A tough plastic-resin sheet in which printed lettering, calibrations and designs, in black or color are permanently incorporated and cannot fade, be removed or erased. Opaque or Translucent for direct or rear illumination; and special finish (2-D) suitable for writing on with pencil or ink and erasing repeatedly without wear on the material.

LAMICOID is now used by countless manufacturers working on Army and Navy contracts. Find out whether Lamicoid can also save valuable metal and delivery time on your war work. Send the coupon below with samples or blueprints of the dials, panels and nameplates you need. We will quote prices and delivery promptly—without obligation.

USE THE COUPON TODAY! E. W. 12-42

ANGUS-CAMPBELL, INC. (Factory Representative to Mica Insulator Co.) | 2122-4th Ave. Seattle, Wash. | 449 S. San Pedro St. Los Angeles, Cal. | 235 San Bruno Ave. San Francisco, Cal.

Quote prices and delivery on: VARNISHED FIBERGLAS____ LAMINATED FIBERGLAS____ FIBERGLAS and MICA____ (Give length, width and thickness of Sheets, Rolls or Fabricated Strips)

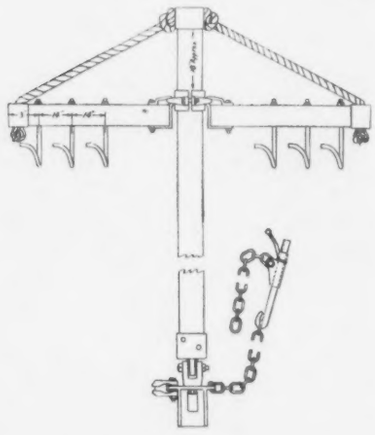
Name _____ *Title* _____

Company _____

Address _____

Temporary Crossarm (1212)

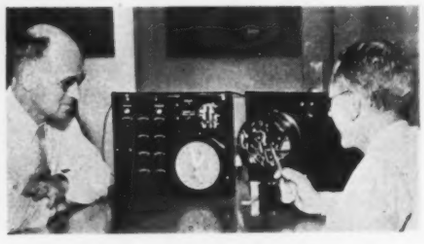
A temporary crossarm to hold distribution lines while the arm is being changed has been designed by A. B. Chance Co. It may be used on voltages up to 4 kv. and for changing four- or six- pin arms. The arms swing up and lock in an upright position and the tool is secured at the bottom by a clamp and at the top by a rope. The manufacturer claims that with this tool two men have changed an average of one arm every seven minutes.



Air Raid Warning Device (1213)

A carrier-current air raid warning device has been announced by General Electric Co. This device can be plugged into the house circuit and will provide audible and visible warning signals. It is designed to operate on 720-cycle carrier-current systems and would relieve telephone lines for other purposes.

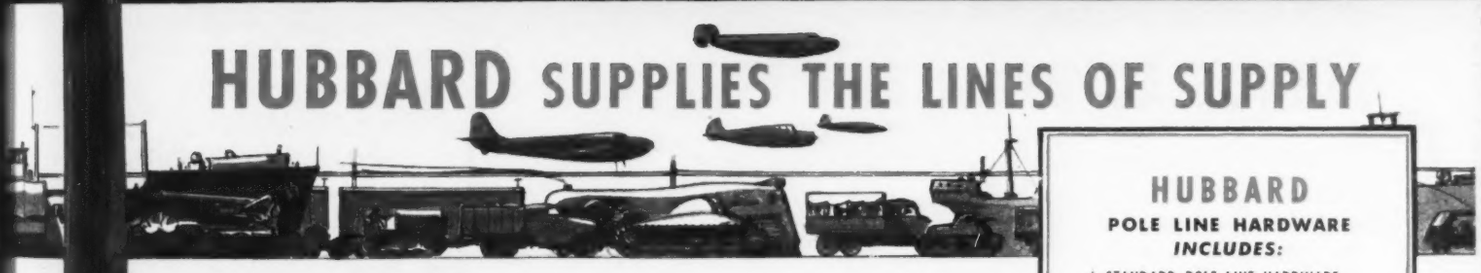
The unit is operated by a special control board attached to the carrier current transmitter at the power station. By means of this control board, four air raid warning signals can be transmitted over electric power lines. When one of these signals is received by the warning device, a warning buzzer sounds. The signal which starts the buzzer also starts a motor-driven selector which begins rotating a small transparent plastic dial which is divided into four different colored sections. This dial turns until the colored section corresponding to the signal sent from headquarters appears opposite a small window in the cover of the device. A miniature 110-volt lamp, operating behind the colored dial and window provides illumination to make visible the colored signal. Colors and signals are: yellow for preliminary caution; blue for advance caution; red for air raid; white for all clear. Signals may appear in any desired order.



The special control board also can send signals which will operate sirens, fire whistles, traffic lights and other warning devices.

Illustration shows warning device with cover removed (right) and control board (left).

HUBBARD SUPPLIES THE LINES OF SUPPLY



Through greatly expanded production capacity, we're able to supply both our customers and our country—doing a two-fold job to speed ultimate victory. In supplying both lines of supply, Hubbard Hardware is carrying its greater share of the electrical power load to plants producing war materiel. Hubbard engineering and production experience, on the other hand, is likewise carrying its share of the load—turning out fighting equipment for our men in battle for freedom.

When there's a need for Pole Line Hardware to construct, extend or maintain essential transmission and distribution lines, always look to Hubbard *first* as your source of supply.

HUBBARD
POLE LINE HARDWARE
INCLUDES:

- ★ STANDARD POLE LINE HARDWARE
- ★ COMMUNICATION SYSTEM HARDWARE
- ★ ELECTRIC RAILWAY HARDWARE
- ★ INSULATOR PINS
- ★ POLE TOP FIXTURES AND STEEL CROSS ARMS
- ★ STRAIN INSULATORS AND CLEVISES
- ★ HIGH TENSION MATERIAL
- ★ SECONDARY RACKS AND ACCESSORIES
- ★ POLE AND CROSS ARM BRACKETS
- ★ STREET LIGHTING EQUIPMENT
- ★ RURAL ELECTRIFICATION MATERIAL

IT TAKES HUBBARD HARDWARE TO WITHSTAND HARD WEAR

HUBBARD

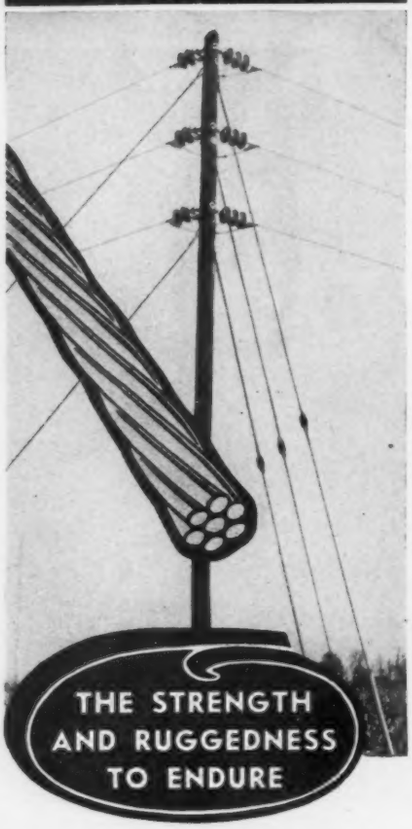
Hubbard and COMPANY

OAKLAND, CAL. PITTSBURGH CHICAGO

HUBBARD

HANG THE LOAD ON HUBBARD HARDWARE

Crapo
GALVANIZED STEEL
STRAND



STRENGTH to support the pole structure under maximum ice and wind loading ... **RUGGEDNESS** to withstand the punishment incurred in construction and service .... **DURABILITY** that outlasts the normal life of the line .... are combined---with important **ECONOMY**---in *Crapo* Galvanized Steel Strand.

Each size and grade develops the full tensile strength of the steel in cross section. The heavy, ductile, tightly-bonded zinc coating---applied by the famous *Crapo* Galvanizing Process---provides lasting protection against corrosion.

There is a size and grade of *Crapo* Galvanized Steel Strand for every practical need. Consult the distributor of *Crapo* Galvanized Products near you or write direct for further information!

INDIANA
STEEL & WIRE CO.
MUNCIE, INDIANA

Fluorescent Fixtures (1214)

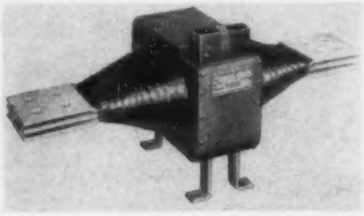
Eight new industrial fluorescent fixtures with composition reflectors have been announced by Sylvania Electric Products Inc. Full Sylvania fluorescent fixture guarantee is placed on these units by the manufacturer, who states that their reflection factor is even greater than that of porcelain enamelled steel

reflectors. Fixtures range in size from 100 to 300 watts and are available for individual or continuous-row mounting. Illustrated is Model HF-100P, with two 40-watt lamps, for individual mounting.

Indoor Current Transformer (1215)

A new indoor current transformer rated 15 kv, 1,000 to 4,000 amp. has been developed by General Electric Co. Designated as Type JK-9, this unit is said to have better accuracy, higher insulation and to be smaller in size than the Type KC-51 it supersedes. According to the manufacturer, this transformer is well suited for relay applications—particularly differential relaying—and metering service.

During overcurrent conditions, with a burden Z, all ratings will be well within 8%

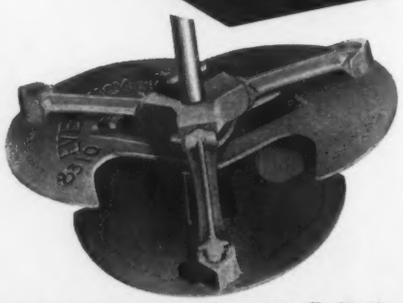


of the true ratio at 20 times normal current, it is claimed. Metering-service accuracy classification of the various ratings is: 100- and 1,200-amp, ¼X, ¼Y and ½Z; 1,500- to 4,000 amp., ½X, ¼Y and ¼Z. The impulse strength of these units meets the test requirements for 95 kv., full-wave, on both insulation and flashover. The JK-9 is 6 in. shorter than the superseded design and requires less mounting space.

Arc Welding Equipment (1216)

Complete equipment for automatic arc welding with heavily coated electrodes in cut lengths has been announced by General Electric. Essential elements also have been made available for conversion of automatic arc welding heads originally designed for operation with thyratron-controlled coiled electrodes to operation with stick electrodes. This equipment, according to the manufacturer, is particularly suited to work where one or more complete joints can be made with a single electrode, such as in the welding of shells, wheels and tubular assemblies where the starting and finishing ends of a single weld bead overlap. It has been used to make edge, lap, fillet and groove welds and applications have included the welding of machine gun water jackets, tank wheels, ordnance shells and refrigerator parts.

First CHOICE IN ANCHORS



EVERSTICK

For dependable anchoring under all conditions, use Eversticks. Made of tough, rust-resistant, malleable iron . . . quick and easy to install . . . expand in undisturbed earth. Preferred by engineers and crews alike.

Write for latest Everstick bulletin.

EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

Make Better WIRE JOINTS Faster!

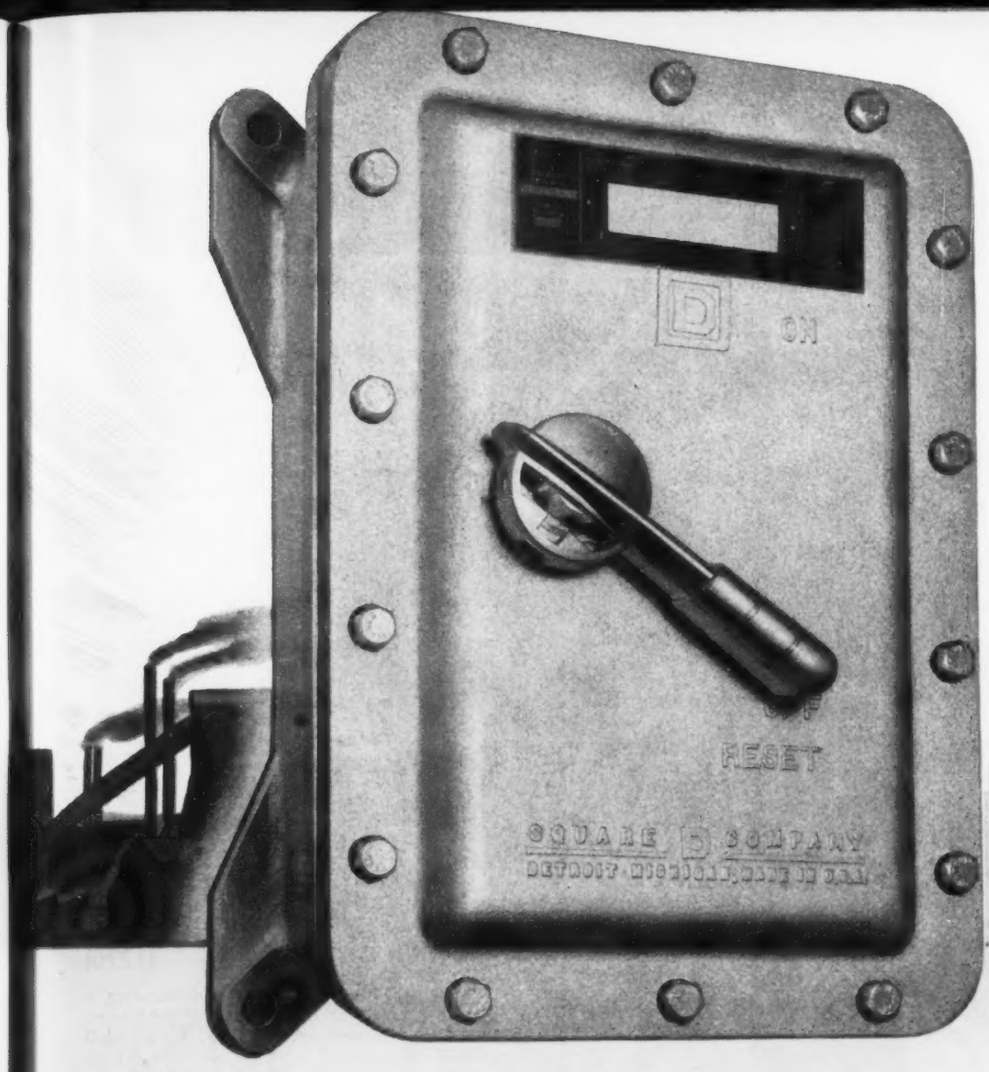
AVAILABLE NOW

Conserve Critical Materials!
Use "Wire-Nuts"—Save critical materials—Lead, Tin and Rubber as used in solder-and-tape joints.

IDEAL Wire-Nuts
Solderless, Tapeless Wire Connectors
Millions in Use—Better electrically; stronger mechanically. Pass inspection quickly. Ask for FREE Samples. FULLY APPROVED. Listed by Underwriters' Laboratories, Inc. SIZES FOR EVERY JOB.

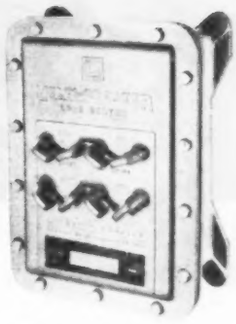
Other War-Time Wiring-Job Speeders

IDEAL SOLD THROUGH JOBBERS
IDEAL COMMUTATOR DRESSER COMPANY
WEST COAST WAREHOUSE STOCKS:
Strieby & Barton Ltd., 912½ E. 3rd St., Los Angeles, Cal.
F. M. Nicholas Co., 1123 Harrison St., San Francisco, Cal.
L. S. Foley, 1233 N. W. 12th Avenue, Portland, Oregon
Robinson Sales Co., 3215 Western Avenue, Seattle, Wash.

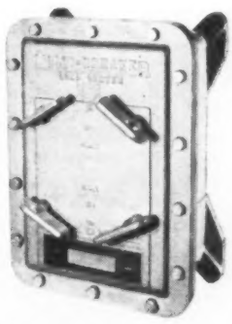


Industrial Multi-breaker—2 or 3 pole, 15 to 100 amp., common trip, quick make and quick break.

MULTI-BREAKERS FOR *Hazardous* LOCATIONS



Multi-breaker Load Centers 1 to 8 single poles or up to 4 single poles and 2 double poles, 15 to 50 amp., 125/250 volt.



Multi-breaker Load Center 1 to 4 circuits, 2 pole, no neutral, common trip, 15 to 50 amperes, 115/230 volts, A.C.

Square D has broadened its line of cast explosion-proof Multi-breakers—in pace with current wartime requirements.

In shell loading, powder, processing and synthetic rubber plants—wherever explosion and fire hazards exist, these Multi-breakers afford low cost circuit breaker protection.

All Class I, Group D enclosures are tested individually at 450 pounds hydrostatic pressure—an added assurance of their strength and stamina on the job. The line also includes enclosures for Class II, Group G locations.

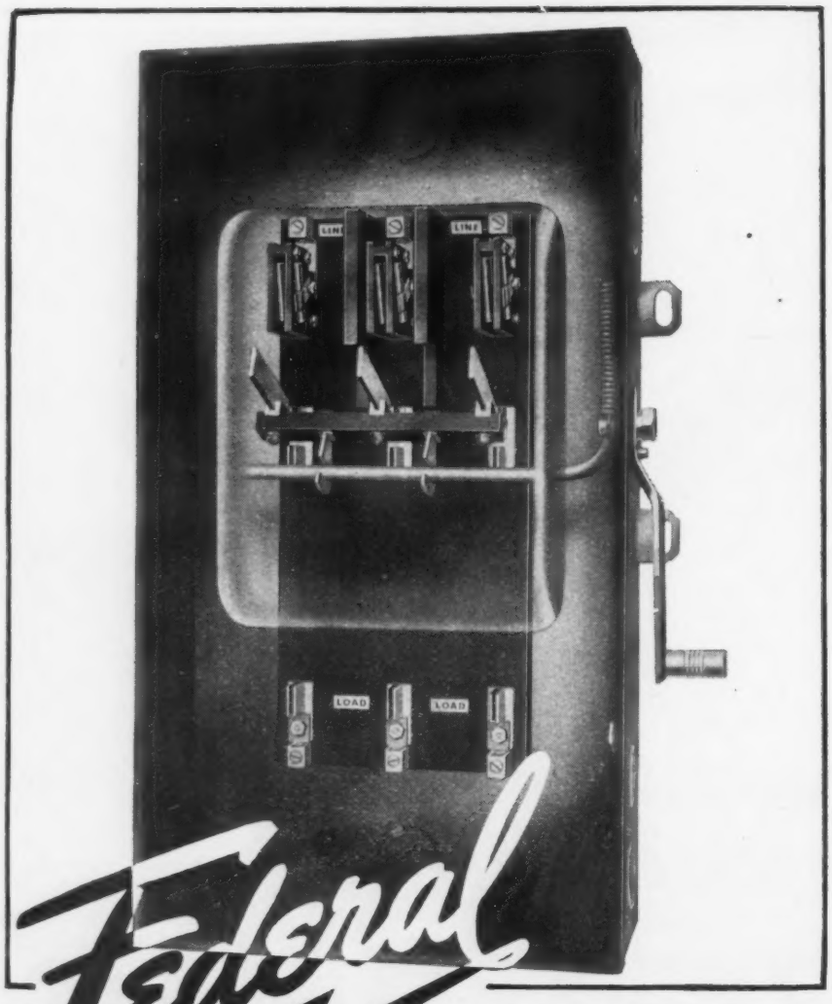
CALL IN A SQUARE D MAN

SQUARE D COMPANY

LOS ANGELES - DETROIT - MILWAUKEE

KOLLSMAN INSTRUMENT DIVISION, ELMHURST, NEW YORK

IN CANADA: SQUARE D COMPANY CANADA LIMITED, TORONTO, ONTARIO



Federal

HARNESSED AN ARC

TO KEEP WAR PRODUCTION ROLLING

There's an aggressive spirit swinging through the country's war working plants—a grim determination to win in the shortest possible time. But to win the war we must first win the battle of production.

That's where this new 575 volt Rolarc Safety Switch comes in. Available from 100 to and including 600 Ampere capacity, it is designed on a radically new and advanced principle of arc control. Two parallel rollers snap together immediately upon disengagement of the blade from the "line" stationary jaws to form an insulated barrier that interrupts the arc—reducing the possibility of arcing to an *absolute minimum.*

By harnessing an arc the Federal Rolarc offers many advantages—conserves war-vital copper by lengthening the life of the switch . . . increases the safety factor . . . saves priceless time and power by eliminating dangerous arcing . . . increases production by eliminating delays caused by switch failure.

These are but a few of the reasons why progressive manufacturers are switching to the Federal 575 volt Rolarc Safety Switch to "keep 'em rolling."

Get complete information about this amazing Rolarc—write for bulletin 42-12.

Until stocks on hand are exhausted we must reserve the right to ship our regular 575 Volt Switch unless Rolarc is specified on the order.

Portland, Ore.
121 N. W. Fifth Ave.
ATwater 5355

San Francisco, Calif.
1264 Folsom St.
UNderhill 2367-8

Los Angeles, Calif.
440 Seaton St.
MUtual 7087

FEDERAL ELECTRIC PRODUCTS COMPANY, INC.

64 PARIS STREET, NEWARK, N. J.

PANELBOARDS • SWITCHBOARDS • SAFETY SWITCHES • CIRCUIT BREAKERS

BULLETINS

data books, etc.

Roller-Smith Catalogue (1217)

Catalogue 1110 has been issued by Roller-Smith Co. covering horizontal drawout metal clad switchgear in 100 000, 150,000 and 250,000-kva capacities at 5,000 and 15,000 volts. Construction details are described and illustrated and dimensional data is given on various types of gears available.

Vinylite Plastics (1218)

Halowax Products Division of Union Carbide and Carbon Chemicals Corp. is distributing a booklet on Vinylite plastics for wire and cable insulation. Included are tables indicating the physical and electrical properties of the compounds and typical applications.

V-Belt Conservation (1219)

A primer listing 23 ways to conserve the life of multiple V-belt drives has been compiled by the engineering research bureau of the Multiple V-Belt Drive Assn. This pamphlet covers selection, installation and maintenance for maximum life.

Resistor Card (1220)

Sylvania Electric Products is distributing a color code resistor card to radio servicemen. The 3 x 3½-in. card shows the A, B, C and D color denotations of a resistor, explains the resistor color code and gives examples. On the reverse of the card is presented Ohm's law.

Discharge Counter (1221)

A 4-page bulletin on its discharge counter for use with lightning arresters has been issued by the General Electric Co. Principles of operation, design and construction, and installation data are included.

Hydro-Electric Power (1222)

Hydro-electric Power is the subject of a 28-page bulletin published by Allis Chalmers Mfg. Co. and containing many illustrations of representative installations. Adaptability of each type of turbine in relation to conditions of installation is discussed.

Bus Drop Cable (1223)

General Cable Corp. has issued a new data sheet covering bus drop cable. Advantages and uses of the cable installation and construction data are included.

Cop-R-Temp Loading (1224)

Cop-R-Temp loading, a method of transformer loading to save critical materials by eliminating "overtransforming" is described by Westinghouse in a 20-page booklet recently released.

Turret Lathes (1225)

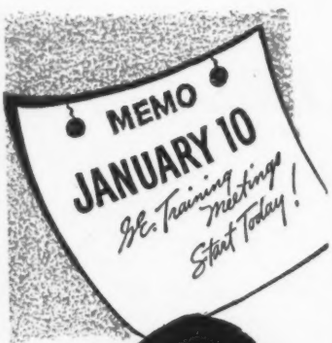
South Bend Lathe Works has prepared a bulletin describing its new Bench Model turret lathes. Construction data and information on capacities, feeds, speeds and dimensions are given.

97% Said: Yes! we want you to continue

G-E SERVICE TRAINING MEETINGS

The Next Series Will Feature

GENERAL ELECTRIC RANGES
AND WATER HEATERS
...Table Appliances and Heating Devices



SERVICE TRAINING continues to be the number one need of appliance dealers. This need explains why thousands of service men have, within the past few months, attended hundreds of G-E product meetings from coast to coast. It explains, too, why nearly 100 per cent of those attending recent schools asked for a continuance of the training programs G-E and its distributors have been happy to sponsor.

The next series of training meetings begin early in January. Headquarters has prepared the most comprehensive program on range service that it has ever offered. In addition, new service material has been prepared on other G-E products—particularly on small appliances and heating devices. Product information on water heaters, refrigerators, dishwashers, laundry equipment and disposalls is likewise available.

The type of meeting to be conducted will depend largely on the service problems in each area. Bring all your service questions and have them answered—or send them in to your G-E distributor in advance for answering during the school session.

GENERAL ELECTRIC CO., APPLIANCE AND MERCHANDISE DEPARTMENT, BRIDGEPORT, CONN.

Highlights of the Next G-E Training Meeting

1. *"Don't Blame It on The Oven."* A brand new movie in full color on oven baking complaints. A professional performance.

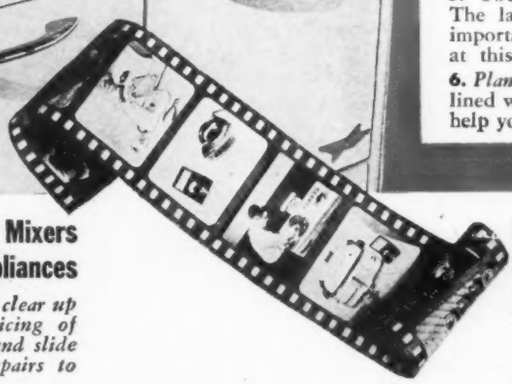
2. *"Heating Unit Service."* A sound slide film giving answers to surface unit and thrift cooker problems. Supplemented with a printed manual that tells the story in picture form.

3. *Oven Adjustments.* New sound slide film on oven adjustments is planned.

4. *"Small Appliances and Heating Device Repairs."* A series of slides that illustrate proper repair methods. The first time this information has been available.

5. *The Situation on Repair Parts.* The latest information on this all-important subject will be discussed at this meeting.

6. *Plans for 1943.* You will hear outlined what G-E has in store in 1943 to help you with your service activities.



New Service Training Slides On Mixers —Irons—And Other Small Appliances

Often a simple adjustment will help clear up a perplexing problem in the servicing of small appliances. This new G-E sound slide film brings you up to date on repairs to Irons, Mixers, Roasters, etc.

REGISTER NOW!

Your General Electric distributor will give you all the facts on the next G-E Service Training Meeting in your locality — the date, the place, the hours. Plan to attend... and to bring all your service men.

GENERAL ELECTRIC

It's all in the plugs

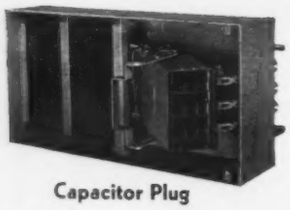
FLEX-A-PLUGS

COMPLETE the TRUMBULL

ENCLOSED BUSBAR DISTRIBUTION SYSTEM

FULL benefits of this system, are dependent upon the wide variety and unique engineering features of FLEX-A-PLUGS that permit immediate connection or disconnection of motor driven machines at any point (12" centers) on the line.

CONSERVE... **ELECTRICITY BY CORRECTING POWER FACTOR AT POINT OF LOAD**



Capacitor Plug

Switch disconnect unit raised to show rear stab connections to busbars in Flex-A-Plugs.

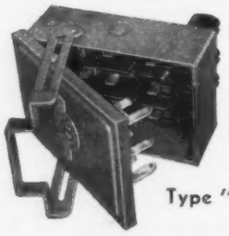
Here, for the first time, is a practical and economical method of conserving electric power by correcting unsatisfactory power factor conditions right at the point of load. **Trumbull Capacitor Plugs,** containing a **G-E Pyranol Capacitor** and switching or circuit breaker disconnects, can be plugged into a Flex-A-Power run at any point along the line.

A maximum saving in power can thus be achieved by installing properly rated correction units wherever poor power factor loads are located. If machines are moved or load conditions vary, the Trumbull Capacitor Plugs may be quickly relocated to meet the new load requirements.

For complete information about Flex-A-Plugs and the entire Trumbull Enclosed Busbar Distribution Systems, write for Trumbull Bulletin 408.

Capacitor Plug Circuit Breaker Disconnect.

CONNECT... **MACHINES IN A MATTER OF MINUTES**



Type "F. L."

Flex-A-Plugs, with "stab" connections to buses, simply plug into Flex-A-Power runs at intervals of 12" or more.

PROTECT... **WITH FUSED SWITCHES RATED IN HORSEPOWER OR CIRCUIT BREAKERS**

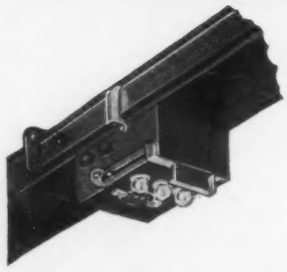
Type "F. E."

Type "F. E." Flex-A-Plugs have Trumbull Type "AT" Automatic Circuit Breaker Mechanism providing automatic over current and short circuit protection.

Type "F. D." plugs contain Type "RBA" heavy duty motor circuit safety switch mechanism.

Type "F. L." plugs with cam operated cover have double break switch mechanism with fuses accessible only when fully disconnected.

INDICATE... **PHASE FAILURE IMMEDIATELY**



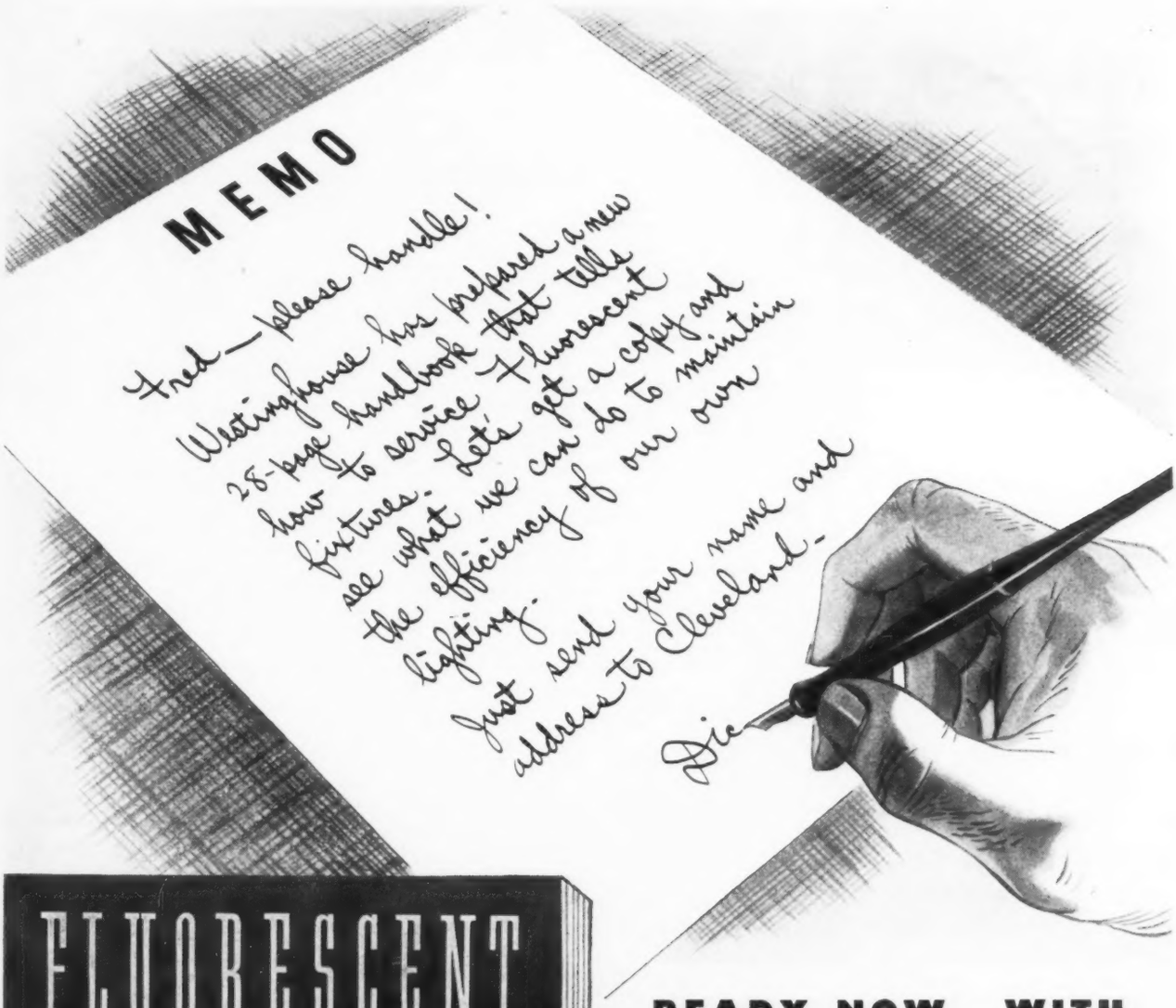
Neutralizer Flex-A-Plugs, installed at ends of branch circuits, protect against voltage build-up in secondary and give instant visual indication of phase failure.

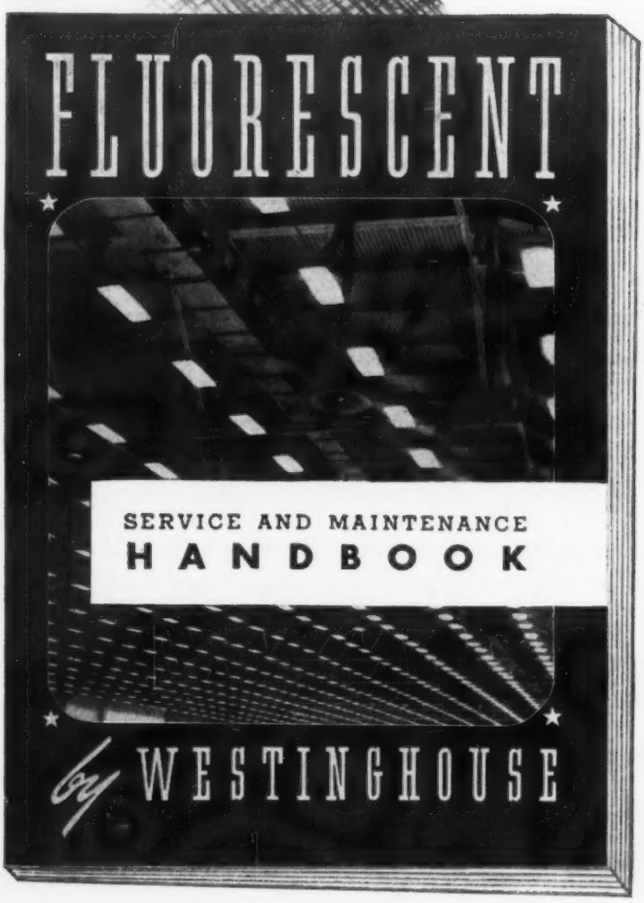
THE TRUMBULL ELECTRIC MANUFACTURING COMPANY

THE TRUMBULL ELEC. MFG. CO. — PLAINVILLE CONN. U.S.A.

PLAINVILLE, CONN.

OTHER FACTORIES AT NORWOOD (CINN.) O. — SEATTLE — SAN FRANCISCO — LOS ANGELES


MEMO
Fred—please handle!
Westinghouse has prepared a new 28-page handbook that tells how to service Fluorescent fixtures. Let's get a copy and see what we can do to maintain the efficiency of our own lighting.
Just send your name and address to Cleveland.
Jim



READY NOW...WITH THE COMPLIMENTS OF WESTINGHOUSE

Westinghouse Electric & Mfg. Co.,
Lighting Division, Department H,
Edgewater Park, Cleveland, Ohio

Please send me a copy of the new Fluorescent Service and Maintenance Handbook — B-3155.

Name and Title _____

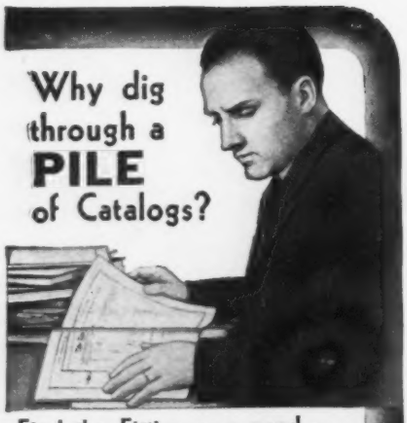
Company _____

Street and Number _____

City _____ State _____

Westinghouse

LIGHTING EQUIPMENT



Find the Fitting you need—quickly—in the COMPLETE line

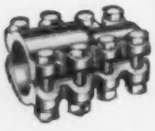
If you have a Penn-Union Catalog, you can instantly find practically every good type of conductor fitting. These few can only suggest the variety:

Universal Clamps to take a large range of conductor sizes; with 1, 2, 3, 4 or more bolts.

L-M Elbows, with compression units giving a dependable grip on both conductors. Also Straight Connectors and Tees with same contact units.

Bus Bar Clamps for installation without drilling bus. Single and multiple. Also bus supports — various types.

Clamp Type Straight Connectors and Reducers, Elbows, Tees, Terminals, Stud Connectors, etc.



Jack-Knife connectors for simple and easy disconnection of motor leads, etc. Spring action — self locking.

Vi-Tite Terminals for quick installation and easy taping. Also sleeve type terminals, screw type, shrink fit, etc. etc.

Splicing Sleeves, Figure 8 and Oval, seamless tubing—also split tinned sleeves. High conductivity copper; close dimensions.

F. M. NICHOLAS CO.
1123 Harrison St., San Francisco

NORTHWESTERN AGENCIES
2411 First Ave., Seattle, Washington

KENNETH ANDERSON CO.
334 East 4th St., Los Angeles

Penn-Union Electric Corp., Erie, Pa.

PENN-UNION
Conductor Fittings

Bus Protection (1226)

Westinghouse describes linear coupler bus protection in a 28-page bulletin. In place of the usual iron core, the linear coupler has an air core inductance coil. A simple high-speed relay, type LC, is used with the couplers. This relay operates at high speed on all internal fault currents. It is provided with impedance taps so that its impedance can be matched to that of the couplers and is inherently shock-proof, the manufacturer states.

Arc-Welding Accessories (1227)

Arc-welding accessories are listed in a 32-page bulletin published by General Electric Co. Items described include goggles, observation shields, ventilated head protectors, chrome-leather protective clothing, flame-proofed welding screens, ultraviolet-ray protective paint, metal and carbon electrode holders, clamps, cable connectors, brushes, chippers, electrode carriers and fillet-weld gauges. Illustrated.

Insulating Varnishes (1228)

William Zinsser & Co., Inc., has issued a booklet on its new line of Bulls-Eye electrical insulating varnishes. These varnishes are made in several types basically designed for different applications and employ only American raw materials, according to the manufacturer. The booklet gives general information about the varnishes; directions for application; and results of laboratory tests.

V-Belt Drives (1229)

Allis-Chalmers Mfg. Co. has published a 12-page bulletin on Texrope V-Belt Drives. Charts and tables are included to make selection easier. List prices, stock sizes, dimensions and construction details are given for all Texrope Drives; and additional descriptions cover the application of Texrope Vari-Pitch Sheaves and Drives and the Vari-Pitch Speed-Changer.

Balancing Equipment (1230)

Bear Mfg. Co. is circulating a booklet on its balancing equipment. This booklet describes Bear Dy-Namic balancing machines available for balancing armatures, fans, wheels, gears, etc.

"Calling All Horsepower" (1231)

How motor overload capacity can be used to get more production from every available unit of horsepower and at the same time effect savings in critical materials is told in a 20-page Westinghouse booklet, "Calling All Horsepower." Six wartime application recommendations are listed and discussed and accompanying charts and illustrations give information on pounds of war materials which can be saved by each method.

Load Calculator (1232)

A load calculator to simplify computation of motor horsepower required for metal cutting operations on various machine tools is being offered by General Electric Co. Called the Motorule, the calculator is designed along the lines of an engineer's slide rule. The user first refers to a table of constants printed on the back of the rule, choosing the constant for the particular type of metal to be cut. Then by setting the scales to the known cutting speed, feed and cut, the user arrives at the cutting power required on the basis of ideal tool and machine conditions.

"Motor Finder" (1233)

A new "Motor Finder" for selecting various types of squirrel-cage motors has been released by Allis-Chalmers Co. This slide rule enables the user to match the conditions under which the motor must operate at the proposed installation with required motor characteristics and thus learn the correct motor type and its features.

Health and Safety Manual (1234)

Allis Chalmers has published a health and safety manual devoted to problems of women in industry. One section deals with proper attire, another gives proper exercise for maintaining good physical condition; a third discusses hazards to be avoided in various occupations. Line drawings and photographs illustrate the text.

Open Wiring (1235)

Delta-Star Electric Co. is distributing a booklet on use of open wiring up to 600 volts for industrial plants. Titled "Saving Copper — a Wartime Necessity," the 12-page publication includes an examination of open wiring from the standpoint of best use of copper, and methods and tables for determining voltage drop.

Recorders (1236)

Operation-time recorders, electric and mechanical, are described in a bulletin issued by the Foxboro Co. Application to various industries is explained and typical installations for different kinds of work are given in diagrams. Complete specifications are included for single and multiple-pen instruments.

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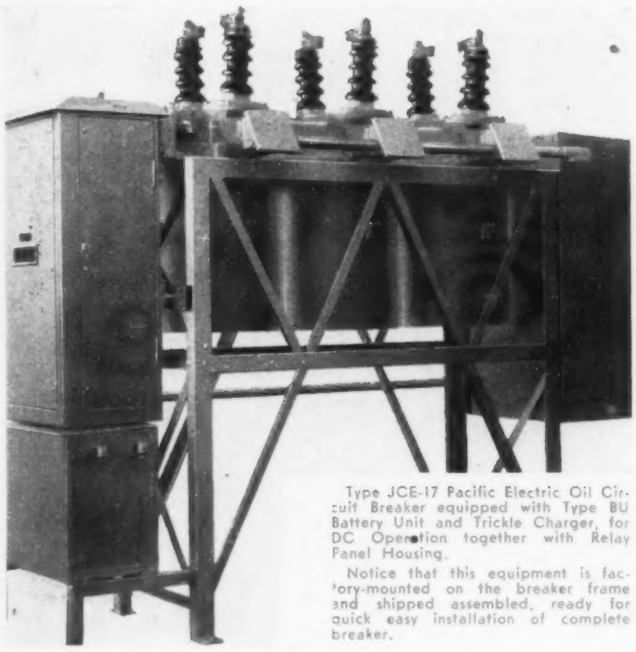

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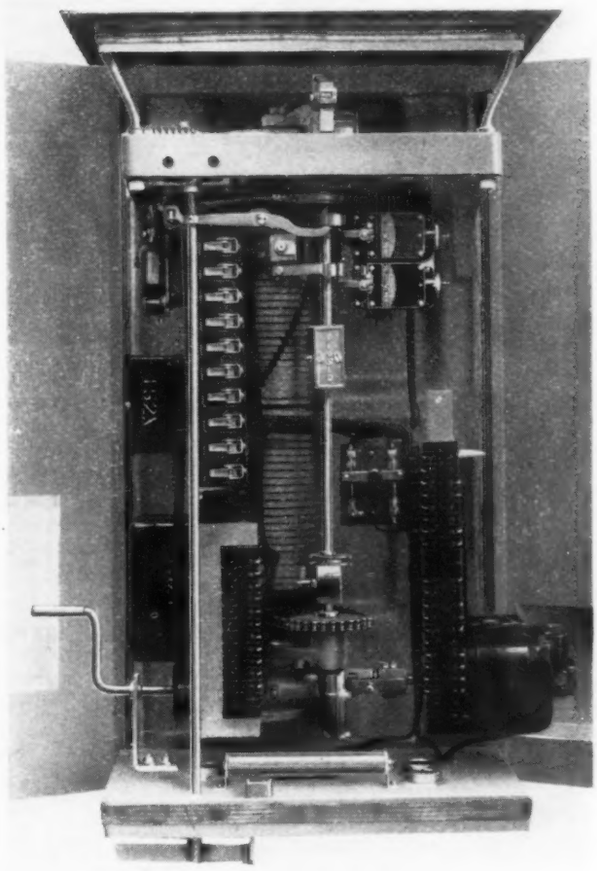

Type MK-1 Operating Mechanism

Pacific Electric Mfg. Corporation

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ELECTRA'S HUSBAND

From F-Tube to Fire Extinguisher

"WELL another one of my projects to make us rich and independent has gone down the rain spout," I said to Electra the other night after Bob Hope had finished his tomfoolery.

"What was that?" she asked, "your whale dairy or your sea water irrigation project?"

"Neither," I answered. "It was my research to find some useful application for burned-out fluorescent lamps."

"You mean I can get rid of that bunch of long glass tubes down in the basement?" Electra inquired. "Praise the Lord! Only yesterday I caught Junior and a bunch of the kids using them for magic wands or something. A couple of them broke and it was a wonder the children didn't cut their hands off."

"Throw 'em away," I said with a sigh of resignation. "But I should have thought of the scheme this fellow developed."

"What does he do with them?" she asked.

"It's a long story, but in the end he makes fire extinguishers out of them," I said. "He just salvages everything that's useful. He gets his main supply from some of the big aircraft factories that are lighted with fluorescent lamps. Pays them a cent or so for the dead tubes. He takes the tube and cuts off the metal ends to reclaim the brass and other critical metals.

"Each of the tubes has a small drop of mercury in it to establish the arc which makes the light burn. Maybe you don't know it but mercury is really one of the almost precious metals. So he salvages that. Then he has some kind of chemical solution with which he washes the coating off the inside of the tube. This reclaims the rare chemical—beryllium, I think it is."

"That's easy," Electra interjected. "Even I could have thought of that if you had told me that the brass and mercury and chemicals were worth salvaging. Look what I do with bacon drippings in the kitchen now."

"Instead of carting them off to the butchers, you had better save them for making biscuits," I said. "That's what my mother used to . . ."

"Yes and your mother could make better crust for her apple pies than I do," Electra interrupted quick as a flash. "Well if you don't like my cooking, you can eat at a hotel."

"Whoa! Wait a minute," I said soothingly "We weren't talking about cooking. We were discussing what to do with burned-out fluorescent lamps. As I said this fellow gets them down to where he has some glass tubing and some salvaged metals and chemicals. Well he cuts the tubing into sections and blows each one into a pear-shaped affair that looks like a large glass ornament. He fills these with carbon tetrachloride, and ergo, he has a fire extinguisher. In case of a fire all you have to do is throw one of these things just like a hand grenade—spang into the middle of the fire. Nature does the rest. If it is only a little fire, there is a tip on the glass thing just like those on the old fashioned carbon light globes. You can break this off and sprinkle the liquid on the fire. Smart idea isn't it? Too bad I didn't think of it first. At about five fire extinguishers to a tube and at 98 cents an extinguisher, it would count up."

"Oh, quit dreaming and come down to earth," Electra said. "If you want a research project, why don't you tackle used razor blades?"

"I'm thinking of that," I said. "I can figure out a way to re-sharpen the things, but I haven't worked out a system for getting them back into that little brass case. Unless I do, it'll be whiskers for me because you can't buy any more."

"Did you ever hear of an electric razor?" Electra asked with an air of finality and a touch of sarcasm.

MAYBE some of you have thought of how to wreck a power plant so that it wouldn't be of any use to the enemy in the case of invasion. It never occurred to me until I picked up a copy of a British electrical magazine. *Electrical Review*, recently and read of the experience of Mr. J. Gray, engineer and manager of the Teluk Anson electricity undertaking in Malaya. He had been eight months in getting from there back to England. Here is the story:

"Mr. Gray informs us that from Ipoh down to Singapore the scorched earth policy was carried out very thoroughly. Although he was only about 120 miles from Penang, the first news received regarding the evacuation of that island was in the news from London in the Far Eastern BBC programme. From then onwards the position began to deteriorate rapidly. On Dec. 26 last Teluk Anson was bombed and machine gunned and Mr. Gray visited the power station only to find that although the plant was running perfectly, there was no staff in attendance. Assistance was obtained from the military and three soldiers were left in charge with instructions where to put oil and how to regulate the voltage.

"On Dec. 27 four of the five generating sets were effectively put out of action. The Diesel engines were first run without lubricating oil or cooling water until the bearings ran and the engines seized up. The fuel pumps and nozzles were then smashed with 14-lb. hammers. The windings of the generators were hacked and cut with axes, all compressed air bottles were discharged and the compressor destroyed. Transformer windings were cut up and all transformer tanks were filled with water. The last generating set was treated in a similar manner before the final evacuation of the town on Dec. 31.

"On reaching Kuala Lampur Mr. Gray joined the Government Electrical Department and saw a good deal of demolition in that area. The Bungsar power station was dealt with in a very effective manner. Couplings between the alternators and turbines were cut with oxyacetylene gear; boilers were emptied of water and fired up until the boiler tubes, etc., collapsed with a roar, whilst every e.h.v. oil-filled bushing was shattered and the substation was destroyed."

Too bad Mr. Gray didn't have any experience demolishing a hydro station. Some of us were talking as to how it might best be done. A lot of novel ideas were thrown on the table. First thing would be to open the oil valves on the transformers and high-voltage breakers and drain them under load. Then let the oil out of the thrust bearing with the machine running. When the unit froze up, this would cut out the governor. The relief valve could be locked out so it would not operate. If the governor closing was speeded up sufficiently, the resultant quick closing of the butterfly valve would put a water hammer on the penstock which ought to burst it. Then probably the whole power house would wash down the river.

Someone asked what the operator would do then. The consensus was "run like hell."

The Second Vital Move

on the chessboard of global war is beginning—*the offensive!* But this could not have taken place until the first move—the production of the implements of war—was well begun. Management and labor, working together, are delivering tools of war in ever increasing quantities. » » A flood of planes, ships, tanks and other mobile units is pouring from American factories. Okonite is making many of the insulated wires and cables on which they depend for power, control and communication. Even the dearth of rubber has not stopped us, because our research laboratories years ago learned how to use synthetics and other materials for insulation. » » Without the constant faith in our country's future that spurred us and hundreds of other American Industries to maintain these research laboratories—our armed forces might still be waiting for the necessary tools of Victory.

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ELECTRICAL WEST

DECEMBER, 1942
VOL. 89 NO. 6

"The Third Component"

which is the faith and understanding that must flow between management and worker and customer

*Hugo A. Bedau**
Chairman, Postwar Planning Committee,
National Federation of Sales Executives

DR. FREDERICK LOOMIS in his new book, *The Bond Between Us,* speaks of a third component. He describes it as the quality or degree of sympathetic understanding and unwavering confidence that is present in every mutually satisfactory interview between a doctor and his patient. In that relationship there are three elements—the doctor, the patient, and the third component, which is the faith, confidence and sympathetic understanding which each holds for the other.

In business, too, there is a third component. It is that priceless ingredient of relationship between management and the workers of industry. It is the electric current of confidence, faith and mutual understanding that must flow between capital, management, customer and wage earner.

We recognize today that the one weak link in the great chain of business management during these past decades has been the failure in understanding the human aspects of life.

It is just beginning to dawn in the minds of the most objective thinkers among our business leadership, that industry is a social as well as a commercial force. We are beginning to realize that management is first a problem of human beings; that production is first a problem of human beings; and that sales is first a problem of human beings. And I believe that future planning is first a problem of human beings. Therefore, we must evaluate the contrasting attributes of management and of labor in our endeavor to find a solution to today's problems, and set up a more workable plan for the future conduct of our business society.

The record shows that our free enterprise society has given the man on the street more of the material things of life than has any other society of man in all recorded history. Yet, it has definitely failed to attain the same degree of accomplishment in its handling of the human relations between management and the worker. We seem to know how to build and develop new refrigerators, stoves, electric washing machines, dishwashers, streamlined automobiles and a countless variety of material things, but we have not learned that our economic, social and political ailments stem from a lack of understanding of human beings.

There are a number of corporations which have been actively engaged in research and development work. You men who are largely trained as engineers are well aware of the general direction of the thinking of these far-sighted corporations and of the splendid results they have obtained.

R. D. Fosdick of the Rockefeller Foundation recently made the following statement, "It has been estimated that of all the money spent on research in Great Britain and in the United States, one-half of the total goes for industrial research and for the underlying pure research in physics and chemistry. Of the remaining half, 50% is spent on research in connection with military questions. Of the remaining quarter of the total sum, the larger part is devoted to research of agriculture and the branches of biology that support it. Further down the line is research in medicine and health. Finally, come the social sciences, with an infinitesimal fraction of the total devoted to their development. For research in the humanities, the amount is relatively so small as to be scarcely discernible."

Little wonder then that business leadership has failed in so many instances in its relations with people. The result is that the worker, from *his* point of view, has been able only to find a defender, or worse yet, a crusader for his interest in the labor racketeer and in punitive legislation. The dramatic success of the New Deal was due to its emphasis on, and understanding of, the social wants of the public and, more especially, the wage earner.

It is clearly seen why we have made so much progress in industrial research and so little or seemingly no progress in our dealings with human beings. We are good in the first, because we have spent so much time and money and have so thoroughly conditioned our minds to the fundamentals of developing the material things. We seemingly know little of the other because we have taken too much for granted the equally important element of the human side of our business society and have, therefore, given it no time or study and have not conditioned our minds to be receptive to an understanding of the human values.

It is imperative that we give the same degree of thought, energy and money for the study of human relations, as we have given to the development of our material successes. Management has the habit of giving attention to the problems that are already apparent. In this new case, the problem is to define the problem. It is important that business search for the basic qualities that make for job satisfaction on the part of the worker.

Do the workers credit business with foresighted leadership, with understanding of human needs and human decency, and with the will to introduce better working conditions and more pay? I am afraid not. In many minds, business did everything possible to resist normal, human advancement. These people are of the opinion, unfortunately, that it took a militant labor union to attain these goals for them.

Labor racketeers know how to use to advantage management's vulnerable spots. As evidence of their ability to lead, they present their case direct to the people. Management has seemingly never learned to take the people into its confidence.

* Condensed from an address before the Pacific Coast Electrical Association at Fresno, Oct. 23.

A great corporation, which we all know, had a management-employee committee of which the president was a member. At a certain meeting, the workers were told to be frank and speak out, since each person sat in the committee as an equal; if there was any criticism of the company, its policies or management, the worker's representatives were to lay the cards on the table in a man-to-man fashion. One honest and naive worker, a foreman of standing and ability, took these words at face value and told the president what the employees thought of certain of his acts. Imagine the astonishment of the committee when they witnessed the president, his dignity injured, literally lay out the foreman in thin slices and unmercifully bawl him out before the group, demanding that the foreman present proof of his statement.

You can well believe that $100,000 or more of that firm's public relations, advertising and welfare appropriations went down the sewer when that story went the rounds of the 3,500 employees. This is a tragic example of the self-esteem of a misguided corporation head who believed his own pride more important than the opinion of his entire organization and of all their friends and contacts. This president surely had no knowledge or understanding of the third component in business.

This is only one example that dramatizes our need to learn to accept wholeheartedly the fact that the problems of production are basically problems of human beings—that the problems of management are basically problems of human beings—that the problems of distribution are basically problems of human beings—that the problems confronting the country for the past decades and today, are the problems of human beings; and above all, we must accept the fact that the problems of future planning are essentially problems of human beings.

Labor union leaders claim that the banker-attorney-retired business man directorate of many corporations is more interested in retaining its equity and the highest possible rate of return on its investment, than it is in considering objectively the broad, human problems of that industry or its business enterprise. It is for no other reasons than these that business has, during the past decade, so completely lost the confidence of a large number of our people and that labor unions have made such tremendous strides forward.

We have an example of the result of this condition when we see that this year will be the most profitable in the history of labor unions. Dues collections are running today in excess of 144 million dollars. This is over 24 million dollars a year better than in 1941. Both the CIO and the AF of L are storing up a vast sum which they, undoubtedly, propose to use in the most effective fashion. They will not only consolidate their gains, but will strike out for new and greater advantages as the next decade progresses and as business finds itself vulnerable at the transitory period between the wartime and peacetime economy.

I don't need to tell you gentlemen that powerful forces are at play to regiment our lives in the postwar period and end forever our American concept of individual freedom. Ideologies are being projected that will end our free enterprise and with it our system of distribution, with its marketing, merchandising, selling and advertising, and will substitute a socialistic order that will make each of us subservient to the state. Unless we act now, the collective managed society with government controlled distribution is just around the corner.

We have been persistently unwilling to face the fact that we have encountered a social and economic revolution and that the revolution has been one of the people crying out for recognition of human values.

One of the fundamental elements of future planning, if we are to retain our free enterprise society, is that of reaching a clean-cut understanding of what it takes to make a worker happy on his job. Very simply stated, job happiness is the belief on the part of the worker that his job makes possible the attainment of his personal aspirations and the ambitions he holds for his wife and family. Workers want a reasonable degree of contentment in their work, they want achievement, a sense of satisfaction in a job well done—they want recognition. These are basic desires of decent, self-respecting human beings. Business men are beginning to recognize this approach to their labor problems.

We must discover whether the wage earner accepts his job as one that gives him satisfaction, contentment and security. There is no job happiness for the worker unless it exists according to *his* judgment—not that of management. The great majority of workers want to give an honest day's work for an honest day's pay. It is up to management to see that this most desirable result is accomplished, so that the wage earner is a co-worker with management in the development of a successful business operation.

When all is said and done, it is what the customer actually thinks that counts in the development of sound customer relations. So too, it is what the worker actually thinks about his job, his company, its leaders and his future in terms of his economic needs and ambitions and sense of satisfaction in doing his daily work that counts most.

This is the problem-solving approach that business should take. Our efforts will fail until we catch that point of view. Labor union leadership, knowingly or otherwise, has caught the spirit of this idea and has preached this philosophy to their people from the point of view of their special interest.

I believe you will agree that it is too often the case that management has sat in its ivory tower watching financial sheets and auditor's reports and has forgotten all about that human being on the production line doing his daily task. So, the worker has wandered off into strange territory where he has been button-holed by people with selfish interests who have exploited him to the limit. What management should do is regain his friendship and confidence. Both labor and management are natural partners in our American business society.

Here is the idea reduced to simple terms. A business is a good business in relation to its ability to have the truck driver believe that his job makes it possible for him to enjoy a sense of purposefulness in his work, win recognition and reward for meritorious accomplishments on the one hand, and on the other to build a new home, buy a new suit of clothes, lay new linoleum on the kitchen floor or hang new paper on the living room walls, and give his children decent living conditions and equal opportunities.

A business man is a good business leader, as far as this truck driver is concerned, only to the degree that he evidences his ability to assist in bringing about these results in terms of the worker's point of view.

The people are firmly convinced that the profit motive yardstick, which gives relatively few men salaries in the upper five or six figure brackets, cannot comprehend the significance of the third component philosophy.

I realize that this presents a rather delicate subject, but from my experience, I do not believe that wage earners object to big salaries if they can be convinced that the man earns it,—the burden of proof rests with management. The wage earner will be amenable only to the degree that the executive is successful in demonstrating to him that he, as the president and leader, so manages the business that it is possible for the worker also to achieve his life's objective. Obviously, this demonstration of ability to lead applies to all members of the management-executive family.

I am honestly enthusiastic for the future, because I believe business leaders are beginning to see the light and many have adjusted their thinking. Those of us who have faith in our business society and in the values to be gained from sound and considered planning for the solution of our social and economic problems, realize that the big job ahead for business is to win the good will and confidence of the people.

We are in for the greatest battle in our history if we are to retain our American free enterprise society. The fight is a social and ideological battle. It can be won only if the issues are clearly understood, and decisions are reached after sound deliberations and only as action is taken now. To win, we must have a plan. We must have acceptable leaders. We must win the confidence of the masses. I believe that our business men can give us that leadership.

Each man in supervisory or executive position can go to work at it today. He can make a convert of his typist, shipping clerk, factory worker. He can demonstrate how important they are to him and how vital he is to them. He should meet with them and take them into his confidence, find out what they are thinking, ask for their opinions and suggestions, show them his many accomplishments. This is a job that each can do in grand fashion and it can begin today.

Each of you men here can ask yourself this question, Do the workers in my business fully comprehend the significance of future planning to their lives? Do they see the accomplishments of our business and of all American industry as being vital to their happiness, contentment and security? Do they have deep appreciation for what you are doing for them? Do they understand? Have you explained it to them? Do you enjoy their confidence? Have they faith in you? Will they gladly follow your leadership?

It's up to each one of you to develop the third component—that spirit of unwavering confidence, faith and mutual understanding between management and the wage earner. The moment of great decision is at hand. The power to bring about a favorable result is within your grasp. Men, let us create the leadership that will act now to inspire the confidence of the people before it is too late.

Horse and Cycle Days

Above: Pacific Power & Light Co. even provides a three-wheeler in its Walla Walla district. Below: PG and E Collector Bert Mansfield

Autos are "out" for many utility services and here are some of their wartime substitutes. Horseman Carl Helm at top patrols a San Diego Gas & Electric line over 65 miles of very rugged country

Idaho Power Co. Servicemen Johnson and Perchal and Foreman Shotwell ready for work

A. G. Cage mounted on one of California Electric Power Co.'s ten tire-saving Servi-Cycles

Synthetic Rubber Processes

A review of the U. S. rubber situation with specific reference to steps being taken to produce synthetics, a study of synthetic characteristics and a discussion of processes in terms of electrical and steam demands

Donald R. Jenkins
Westinghouse Electric & Manufacturing Co.

HERE are some facts about rubber. Any consideration of synthetic processes must be related to them. Requirements for natural rubber in the United States in 1938 were 660,000 tons used in many ways. In 1939, 76% of all rubber consumed went into automobile tires, and in addition each automobile used 36 lb. of rubber for such other purposes as gaskets and floor mats. In 1941 consumption was 766,000 tons. In January 1942, the finished tire inventory was 6,602,000 tires to be parceled out among 27,000,000 automobiles.

Wartime use of rubber has surged upward despite the fact that civilian delivery of new tires has been drastically restricted. Besides supplying our own needs out of our natural rubber stockpile, we must also bolster the dwindling supply of our allies. One report states that one-third of the natural rubber on hand at the outbreak of the war had been used up by last July 15. Before a civilian can possibly dream of new automobile tires, he must consider the army, navy, and vital defense agencies' needs—not to mention those of our allies, the United Nations.

The following tables were set up by the Baruch Committee as the supply and requirements of rubber for the next few years.

SUPPLY (Thousands of Tons)

	Stocks July 1, 1942	Expected 6 mo. 1942	Additions 1943	Additions 1944
Natural	578	12	41	68
Buna S	—	0	386	705
Neoprene	—	4	30	59
Butyl	—	0	62	132
Thiokol	—	0	54	60
Reclaimed	47	160	360	400

REQUIREMENTS (Thousands of Tons)

	6 mo. 1942	1943	1944
Military	138	325	325
Private transp.	1	3	5
Commercial vehicles	28	59	85
Other civil uses	24	49	50
Foreign countries	74	117	103
Totals	265	577	672

History of Synthetic Rubber

Chemists usually try to make a synthetic product by analyzing and determining the molecular structure of the natural product and then duplicating it by artificial means.

Natural rubber is a latex that flows between the inner and outer bark of a rubber tree which nature makes by building a complex molecule from many simple molecules of a hydrocarbon called isoprene. This much was discovered over 80 years ago. In fact, Michael Faraday, a name familiar to every electrical man, gave rubber its chemical formula, $C_{10}H_{16}$, in the year 1826. Later it was changed to C_5H_8.

Chemists were never able to duplicate the process of nature; however, they tried persistently, and their efforts were rewarded by finding a great many products which in many respects were better than natural rubber.

The Germans, during World War I, made about 2,500 tons of the so-called methyl rubber. This product was unsatisfactory, and because of its inferiority, was abandoned. Due to the extremely high price of rubber after the last war, Germany, Russia and the United States started research for synthetic processes out of which have come several synthetic rubbers, each with its own particular characteristics. (In 1925 natural rubber was $1.25 a pound.)

In Europe the chemists seeking a synthetic rubber found that if butadiene, a hydrocarbon, was placed in the presence of water, an emulsifier, and sodium serving as a catalyst, and the correct heat and pressure applied, 2,000 or 3,000 of the fundamental butadiene molecules (C_4H_6) would join hands, so to speak, and a type of synthetic rubber be formed. This chain-like structure is the fundamental characteristic of all rubbery substances. The chemical process by which simple molecules are induced to join together to make complex molecules is called polymerization.

The Germans later found that if small amounts of styrene (ethylene and benzol) were combined with the butadiene in proportions of one part styrene to three parts of butadiene, a better product was obtained. This product is known as Buna S. Also, when a second substance, acrylonitrile, is combined with butadiene, another synthetic rubber known as Perbunan or Buna N is produced.

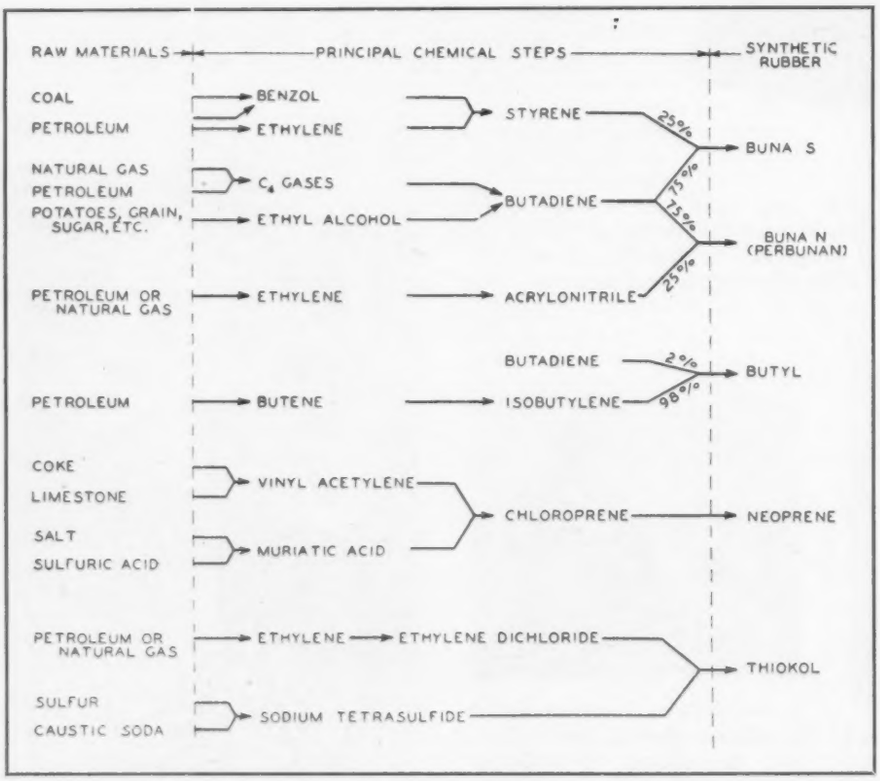


Fig. 1—Synthetic rubber process chart showing the raw materials used, the chemical steps and the resultant rubbers

At that time the chemists in the United States were working along lines other than the use of butadiene. About 1928, Dr. J. C. Patrick, a research chemist for Armour & Co. in Kansas City, mixed ethylene dichloride (Prestone) and sodium polysulphide together in search of a better anti-freeze. Instead of the anti-freeze, he got a gummy mass that looked, felt, and acted like rubber. This new substance was *Thiokol*, the first commercial synthetic rubber in this country.

In 1925, Elmer Bolton of the Du Pont Laboratories heard a lecture by Professor Julius Nieuwland of Notre Dame on acetylene. In Nieuwland's results, Bolton saw the missing key by which he was able to produce neoprene in 1932. Neoprene has many rubber-like properties although it contains 40% chlorine, which is not contained in natural rubber.

The B. F. Goodrich Co. obtained in 1933 a patent on *Koroseal* which is a plasticized polyvinyl chloride having many rubber-like properties which are desirable.

The Standard Oil Co. of New Jersey developed a product from isobutylene obtained from petroleum. This product called *Vistanex* was originally produced in Germany as *Oppanol*.

The chemists of the large rubber companies in Akron developed synthetic rubbers from butadiene. These are being made in commercial quantities. The Goodrich-Phillips petroleum product is known commercially as *Ameripol*. The Goodyear variety is known as *Chemigum*, which has three degrees of hardness.

The Standard Oil Co.'s latest contribution to the synthetic rubbers is Butyl, a product made almost entirely from isobutylene and a small amount of butadiene, both of which are obtained from petroleum.

Table I—Comparison of Natural and Synthetic Rubbers

	Natural Rubber	Buna S	Buna N	Butyl	Thiokol	Neoprene
Tensile Strength	High	High	High	High	Low	High
Abrasion Resistance	Good	Exc.	Exc.	Fair	Poor	Exc.
Elasticity and Rebound	Exc.		Good	Poor*	Poor	Good
Resistance to Aging	Fair		Exc.	Good	Exc.	Exc.
Resistance to Gasoline	Very Poor	Good	Good	Very Poor	Exc.	Good
Resistance to Sunlight	Fair	Good		Exc.	Exc.	Exc.
Resistance to Flexcracking	Good		Exc.	Exc.	Fair	Exc.
Electrical Conductivity	Low	Medium High	Conducting		Medium	Medium
Dielectric Strength	Exc.		Fair		Fair	Fair
Resistance to Corona	Poor		Poor	Exc.	Exc.	
Can Be Vulcanized	Yes	Yes	Yes	Yes	No	Yes**

* Poor at room temperature; good at 200°F. ** But not with sulfur.

Types of Synthetic Rubbers

The types of synthetic rubbers have been described above, with their histories. Fig. 1 is a synthetic rubber process chart which lists the synthetic rubbers, the raw materials used, the principal chemical steps that they go through and the type of rubber produced.

Buna S, Perbunan (Buna N), Thiokol, neoprene, and Butyl are the present leading synthetic rubbers because their characteristics are nearest to those of natural rubber. Natural rubber has so many diverse properties that it is hard to say when any particular compound can be called a "synthetic rubber."

Buna S is the rubber which will be produced in the greatest quantities, not because it is absolutely the best, but because it has the best potentialities for tire rubber. This is because of its method of manufacture and its adaptability for use in the present rubber mill machinery. Butyl rubber could be used since it is cheaper than the other Buna rubbers, and it can be produced in a continuous process instead of the batch process by which Buna rubbers are produced. Due to internal heat caused by flexing of the tire sidewalls, Butyl is not as desirable as the Buna rubbers. Moreover, Butyl is virtually untried, and this is not the time for long trial periods. However, this type of rubber may come to the front soon.

Table I is a comparison of natural rubber and synthetic rubber. Study of it raises the question "Is synthetic rubber as good as natural?" This is a difficult question to answer because in some respects synthetics are better than the natural rubber, but as Table I shows, they are not better in all respects. However, if natural rubber ever becomes

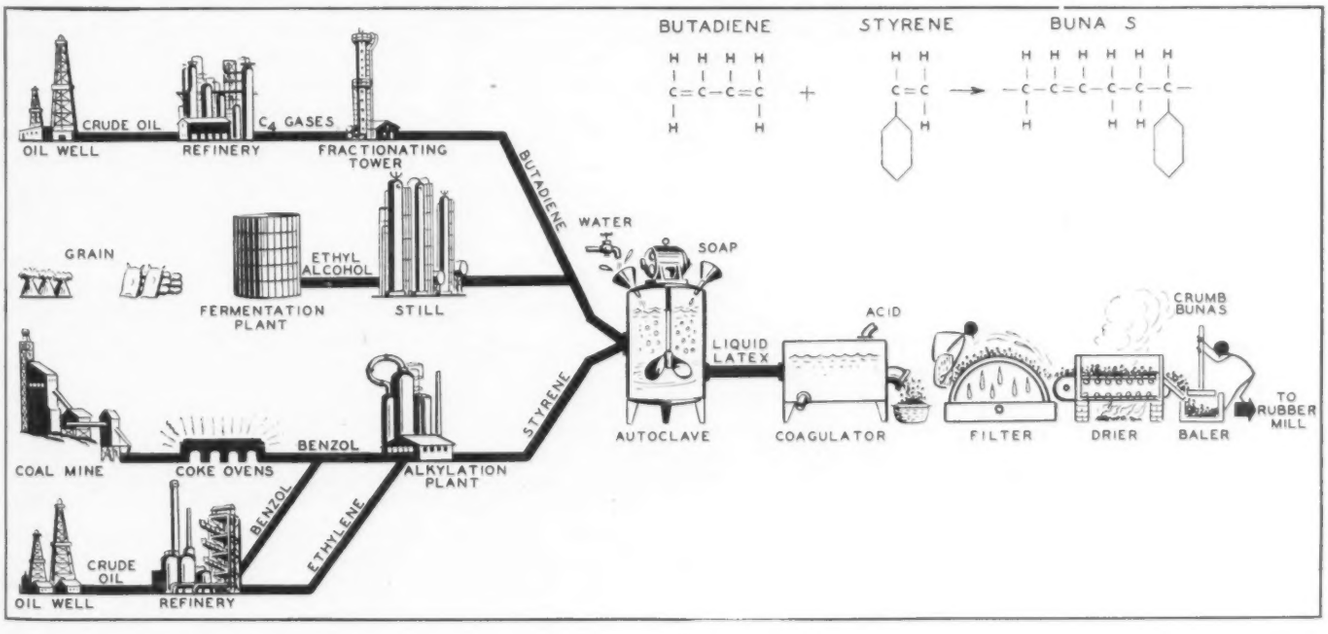


Fig. 2—Diagrammatic representation of processes involved in the manufacture of Buna S which shows sources from which principal raw materials can be derived

available again, the combination of natural and synthetics will undoubtedly give the best product available.

As far as elasticity and rebound are concerned, natural rubber is superior. Natural rubber is also softer, and, therefore, its workability is better in the rubber machinery. Rubber is more resilient than nearly all synthetics, that is, it has a low energy absorption and, consequently, does not build up temperature on repeated compression and extension. This is usually a good feature. However, low energy absorption for vibration such as that encountered in engine mountings is not desirable. Natural rubber is also more resistant to stiffening in low temperatures; however, they are improving synthetics in this respect.

Natural rubber properly compounded with carbon black gives a material superior to most synthetics in that its tensile strength is generally between 2,400 to 4,500 lb. per sq. in. Some synthetic rubbers equal it but none surpass it.

Perbunan and Buna S are better than natural rubber for resisting abrasion, a good feature when considering tire wear. The real superiority of synthetic rubber is in its resistance to ozone, chemicals, oils, sunlight etc. Thiokol, neoprene, Perbunan and Koroseal are highly resistant to oil and have largely replaced natural rubber in applications where oil is encountered. Balloons use Thiokol and neoprene not only because of their resistance to sunlight, but they are 25 times more impervious to gases than natural rubber. One can see that inner tubes made of such synthetics will hold air indefinitely.

Synthetics, neoprene and Koroseal in particular, are being adapted extensively for insulated wire. This is not for electrical superiority, as some are slightly inferior, but because of their better resistance to burning and to deterioration by ozone. The dielectric constant of the Buna rubbers, except Perbunan, is about the same or slightly lower than that of natural rubber, but the others, Thiokol, Koroseal and neoprene, are higher in that order. The power factor of Vistanex is lower than natural rubber. Buna S about the same, and Thiokol and neoprene higher.

Since rubber is a material used in many engineering applications, one can see why synthetics were displacing it in some places, despite the prewar four to one price handicap. Whether synthetics will predominantly replace natural rubber when the war is over and free trade is resumed, depends upon the following factors:

(a) The cost of natural rubber.

(b) The cost of synthetics when produced on a high production basis and with a background of technical experience.

(c) The improvements which will undoubtedly be made in synthetic rubber.

How Buna S Rubber Is Manufactured

Fig. 2 shows very roughly and diagramatically what materials and methods are used to manufacture Buna S. The base raw materials that go into the Buna S are butadiene and styrene. Butadiene is a gas at normal temperatures (boils at 25°F.) It can be made in many ways. It can be grown from ethyl alcohol distilled from grain or from molasses and potatoes. Before the war, Russia was making most of its butadiene from potatoes. It can also be made by a very complicated process starting with limestone and coal, which are converted to calcium carbide in electric furnaces, thence to acetylene, to aldol, to butylene glycol, and then butadiene. This is a costly multi-step process which the Germans have had to use because of their lack of alcohol-producing crops.

Most of the butadiene in the United States will come from crude oil because it is abundant and low priced. Gases with four carbon atoms are given off when cracking petroleum by means of heat and pressure. These are butane (C_4H_{10}), butene (C_4H_8), and traces of butadiene (C_4H_6), depending upon the type of process used. Until a few years ago, these gases were either burned or made into chemicals—only small amounts of them were used in gasoline. They were later utilized in the manufacture of 100 octane gas that became popular after the thirties.

The butanes and butenes from the recovered gases can be reprocessed, and the excess hydrogen atoms driven off to make them into butadiene in the refineries. In addition to this, oil field gases are being scavenged for all available butanes, and this is an important source. There are many different ways of making butadiene from gases by the use of different catalysts, etc. Recently, the Standard Oil Co. announced a new "fluid" catalyst by means of which much more butadiene can be made from butanes. Even if new plants are being built or are built in the future, they will not differ much from the old refineries.

The second basic material used in the manufacture of Buna S is styrene, a liquid which boils at 295°F. It can be made by combining ethylene and benzol. Ethylene can be made from alcohol or petroleum. Ethylene and benzol are combined by catalysis into ethylbenzene and ethylbenzene is cracked to styrene. The chemical companies have been making this for a long time.

The last process after obtaining butadiene and styrene is to combine them by co-polymerization, explained as "a combination of giant chain-like molecules such as a freight train which is a long string of cars, (butadiene molecules), and a few flat cars, (styrene molecules), interspersed at regular intervals. In this way, the freight train could be 2,000 to 4,000 (cars) long. This combination or co-polymerization can be accomplished by mixing the butadiene with the styrene in water with a catalyst and emulsifier in a large chamber such as the autoclave shown on the diagram. The material thus mixed under the proper temperature and pressure comes out not unlike milk and very similar to natural latex. This is Buna S. By adding acid to this milky latex, coagulation is accomplished. When the liquid is filtered off, and the residue dried, it can be baled, and it now closely resembles the natural rubber as it comes from the plantations.

This co-polymerization is an entirely new process and will be under the jurisdiction of the rubber companies and their technologists. As the material is now in a stage similar to natural rubber, it can be worked by the same rubber mill machinery heretofore used with natural rubber, with perhaps a slight increase of power necessary to drive the machinery on account of the increased toughness of its composition.

(To be continued)

Meter Policy

Wartime advantages of a meter policy designed to encourage the use of "A" type single-phase meters have been demonstrated by one Pacific Coast power company. During the last two years between 85 and 90% of its single-phase installations have been "A" type.

The program calls for the installation of a standard pull box by the contractor, upon which the utility can mount the new weatherproof "A" meter with its standard adapter and safety device. Or the company can use a single-phase meter housing which also fits on the standard pull box if it is desired to install an older type meter. This box will accommodate many of the older types with their off-standard terminal arrangements.

Should present wartime stocks of meter housings or adapters give evidence of becoming exhausted, the company feels that substitute materials can be employed Experiments have been conducted with plastics and a possible wooden housing has been designed which could be used now and replaced later when standard materials are again available.

No Astragals

Engineer pleads for dropping of "specials" for duration

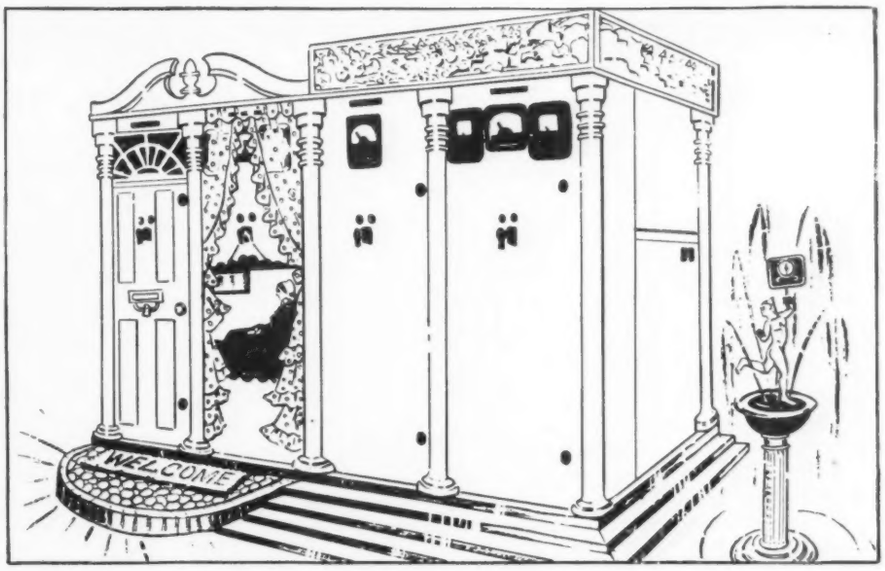
STANDARDIZATION as applied to American products and processes is one of the principal contributors to the American standard of living. And it is one of the phases of the American industrial machine which will help to win the war more quickly.

Production engineers know these things, so it is not surprising that they should evince just a touch of irony when a customer's requisition comes along with a request for "specials," as they so frequently did before the war, and occasionally do today. One such instance was the reaction of a General Electric switchgear requisition engineer when a customer requested that astragals be used to decorate the doors of otherwise standard switchgear. He found that a dictionary defined astragal as "the Greek term for a semi-circular molding or bead around the shaft of an Ionic column." Maybe it was this bit of architectural knowledge that inspired the following memorandum:

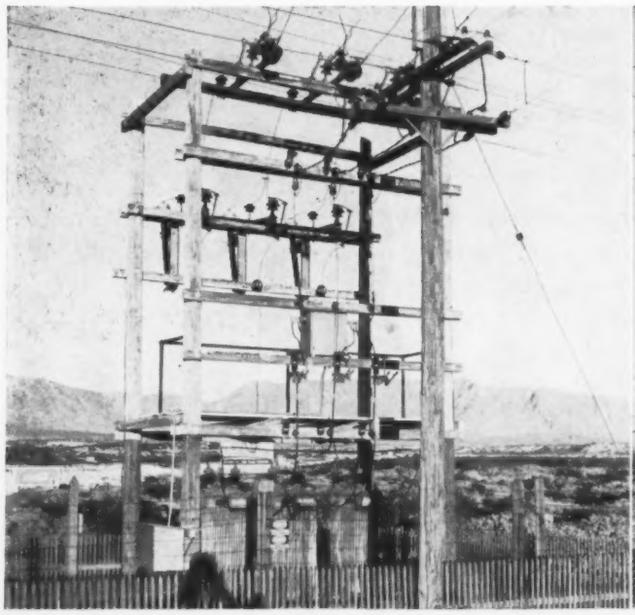
"May I comment on Customer's Specification 10425, paragraph 3-06, which states in part—'The rear of these panels shall have double doors with astragal in center. . . .'

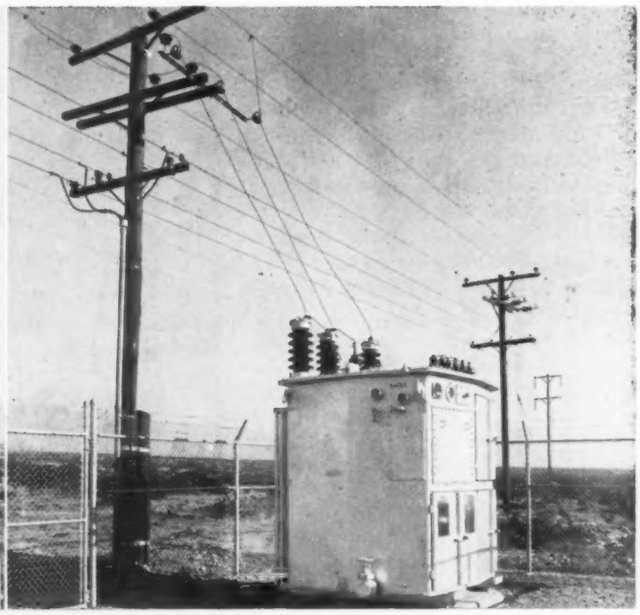
"It pains me to report that we have just run fresh out of astragals. I am asking Mr. Caton to call the WPB this morning asking for a priority on this item. In lieu of furnishing astragals, may we suggest Colonial doors with brass knockers? Swiss dot curtains would go very nicely in place of our ugly rear covers, and perhaps a picture of Whistler's *Mother* would give the bus structure that homey touch it now lacks. Or, perhaps in preference to early American, we might go back to the Greeks who have inspired so much of our architecture. Instead of a prosaic steel corner post, we could furnish Corinthian columns between units. The entire switchgear could be set up on a marble base with a sweeping stretch of forty steps leading up to it to give it the imposing magnificence it deserves. If the customer will give us twenty additional feet of height, we could probably induce the Metropolitan Museum to sell us a heroic frieze of the Defense of Thermopylae, which can be mounted above the gear. A pretty fountain or perhaps a marble bird bath in front of the assembly would give an authentic touch."

Maybe there will be fewer "specials" in wartime specifications if this engineer's reaction is taken to heart.



This is how an artist sketched switchgear suggested in lieu of apparatus decorated with ornamental Grecian astragals





Simplification is demonstrated by this single 750-kva. Westinghouse transformer (right) which replaced the old 300-kva. substation consisting of three separate single-phase units on the system of the El Paso Electric Co. The new unit is fully enclosed and automatic. It has built-in air circuit breakers and lightning arrester

Line Construction Crew Has But 8 Regulars

Steel tower line built in record time by crews numbering 150 assembled around 8 experienced men

WARTIME personnel training possibilities, particularly of construction forces, were demonstrated recently by a Western power company in the construction of a steel tower high-voltage transmission line, identity of which must be concealed for military reasons. Considerably more than 50 miles of line were constructed under emergency conditions over difficult terrain by crews numbering 150 men which were built around a nucleus of only eight men having previous transmission line construction experience.

When orders to build the line were received, the power company was able to muster from its war-depleted personnel the following men with previous training for a job of this kind: two foremen, two sub-foremen, and one each surveyor, tractor operator, truck driver and lineman.

From this nucleus of eight men it was estimated that it would be necessary to expand to a peak of approximately 150 men.

Only one experienced surveyor was available, so it was necessary to put instrument men with no experience whatsoever in surveying transmission lines in charge of survey parties. Since it was essential that construction start at the earliest possible date, the instrument men were only given a very limited amount of direct supervision, it being the regular surveyor's responsibility to supervise three parties throughout the job. It was impossible to give sufficient instruction and supervision at the start to prevent the inexperienced surveyors from getting into frequent difficulties, but of the three new surveyors, two were able to do fairly satisfactory work in a short time. However, one of them was called into the military service when the survey was approximately 50% complete, making it necessary to train another surveyor.

Due to the rugged territory and the length of the line it was impossible for one foreman to give proper detailed supervision to the construction of the entire job. Therefore it was decided to put a foreman in charge of each of the three principal operations and to have the supervisor coordinate the various phases of the construction through these three foremen.

The construction force was divided as follows: Footing installation crew, tower installation crew, conductor installation crew.

The footing installation crew was expanded from the following experienced men: one foreman, two sub-foremen, one carpenter, one powderman, one tractor driver and one truck driver to a peak crew of approximately 100 men. Practically no experienced construction men were available; therefore with rare exceptions all of the additional men were hired as laborers and many of these were not accustomed to this kind of work.

From this group the most promising were gradually trained for the following occupations: compressor men, concrete men, mixer men, truck drivers, concrete foremen and others.

Considerable study was given to picking out the right men to act as foremen for the footing setting and concrete crews. A carpenter foreman was put in charge of the first concrete crew and he developed men in this crew to start a second crew. An axe-man from one of the survey crews with direct supervision for a short time, proved to be an excellent templet setter. The templet setting and the concrete crews did their work so well that there was only one tower out of 315 that was not easily erected with only occasionally slight drifting.

The tower installation crew was expected to be a headache as there was very little likely personnel from which to form four erecting crews and one ground assembly crew.

An especially dependable sub-foreman with previous tower experience who was in charge of cookhouses and field clerical work was given the complete responsibility of receiving, delivering and erecting the towers.

There were only two other men on the job who had experience in tower erection, so a man who had previously been an especially good tower leader was secured from the substation construction crew and this man had the job of developing all of the other towermen. When vacancies occurred on the other tower crews, he furnished the most likely man from his crew and developed a new tower man. If the man did not make good on the new crew he was sent back to the training crew for more experience. This method proved very satisfactory. It took approximately two months to develop enough towermen for four crews. Out of the four crews there were only about enough high grade towermen to make one crew, but the others were fair.

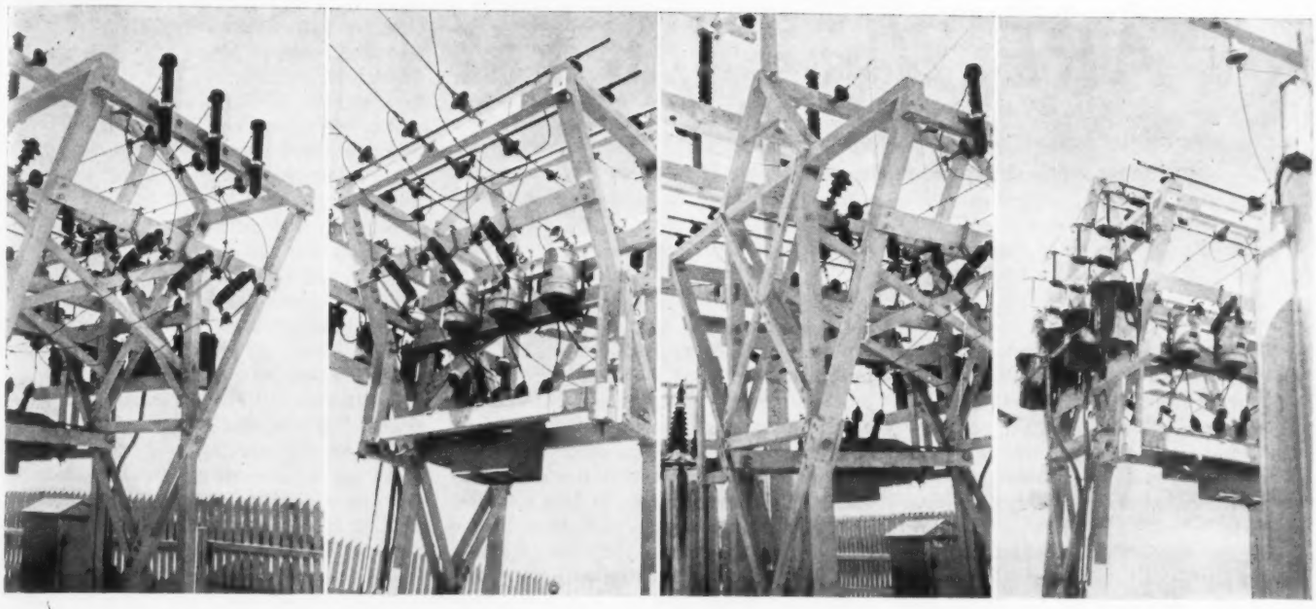
The personnel for the tower crews was principally selected from the men that had advanced from hole diggers to other crews and this of course required developing other laborers to take their places. This process naturally meant that the sub-foreman in charge of the laborers was unable to keep the type of men desired but this was unavoidable.

The conductor installation crew was started with one experienced foreman, one experienced transmission lineman who had a limited experience as a foreman, several experienced truck drivers and a good distribution line crew with no experienced groundmen. The distribution linemen and line foremen readily adapted themselves to the transmission construction.

Despite all of the personnel difficulties encountered, the line was constructed within the scheduled period with an accident rate that was considered highly satisfactory, even if experienced personnel had been employed. Additional data involving the personnel requirements and changes are reported in Table I.

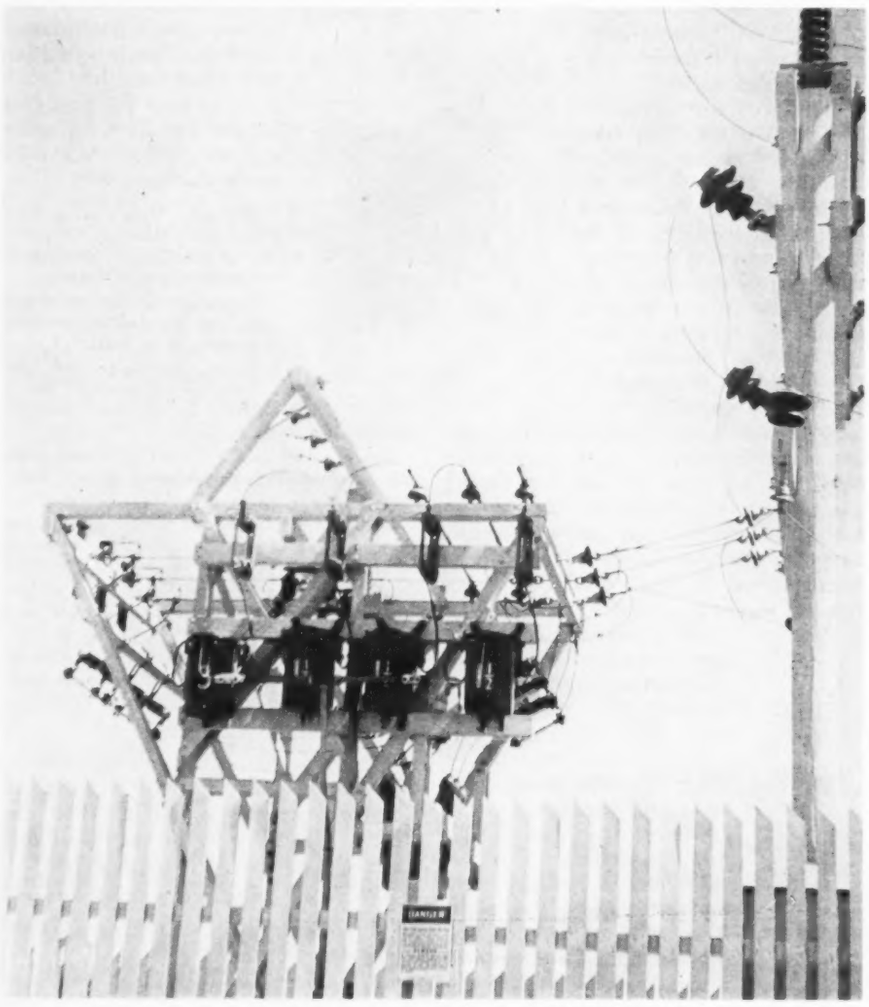
Table I — Personnel Data for Construction of High Voltage Transmission Line from a Basic Crew of Eight Experienced Men

New men hired	259
New men re-hired	54
New men transferred to job	53
Total men engaged	366
Maximum crew	165
Promoted on job	114
Left for better job	128
Left for reason unknown	29
Left because dissatisfied	28
Left because dissatisfied with supervision	0
Left for military service	29
Discharged	15
Terminated due to accident	0
Worked less than one month	104
Transferred to other departments	62



Complex Substation Structure Built of Wood in Place of Steel

Portland cement paint provides protective coating comparable with metal pigments; experiences show that it is more or less fire resistant



DEGREE to which wood may be substituted for steel even in complicated structures is indicated by the distribution substation designed by Idaho Power Co. for serving war loads of a temporary nature. Conservation of critical supplies of steel was the main purpose of the wood design. The 3-phase all-wood structure was designed initially for service at a Japanese relocation center and has since been duplicated at an Army air field.

The wood is treated with a Portland cement type paint, a practice followed by Idaho Power for many years in the case of wooden structures. Containing no metal pigment, the paint has good preservative qualities and at the same time is more or less fire resistant. Details of the station are shown in the accompanying pictures. The design was worked out by Don Russell, substation designer in the engineering department.

● IN ORDER TO REDUCE auto mileage to a minimum, one Pacific Coast power company is adding to the tools ordinarily carried on a serviceman's truck. In addition to a supply of good hand tools, equipment includes sets of small blocks, grounds, live-line cutters and any other tools which will permit the greatest amount of work possible in the field without having to come in to the warehouse for special materials or tools. Stocks of mechanical connectors carried on the trucks are being increased so as to conserve solder.

You *ARE* What You Eat

Food is power, a utility home economist reminds business men, and presents examples to prove it

Nancy Finch
Utah Power & Light Co.

YOU are the product of what you eat. And when I look over a group of "tired business men," I can see many variations in the result.

Rather than select examples from the audience, let's look at ourselves in picture form. This way you can always figure that the horrible example is the fellow next to you.

Figure 1

Here are two charming examples (Figs. 1 and 2): the fellow who looks as if he had never had enough to eat, and the fellow who looks as if he had never done anything but eat. These can be cases of too much or too little, or the wrong kinds of foods, or the wrong balance.

Perhaps you don't look just like either of these two fellows, but have other problems that better eating habits could have helped. You might have been taller with broader shoulders; less bowed or knocked-kneed. You might have been able to hold on to those pearly teeth longer or shown less evidence of "pink tooth brush". Those wavy locks might have remained more in evidence. I can't account for all of the things which made these two what they are, but certainly a life time of the right foods and good eating habits could have done a great deal to help the general contour.

So what about this business of food? After all you've been eating all of your life, and by some mistake or miracle have survived to your present state. What's the matter with you? Sure you get a cold occasionally; maybe you're a little tired and crabby once in awhile (with apologies to wife and secretary for this understatement); maybe you just don't feel like a bang-up day's work every day; suppose you are losing a little hair, etc., etc. That could happen to anybody, and frequently does.

Figure 4

Well, of course, I can't account for the miracle of your survival, either, and neither you nor I will ever know what a fellow you might have been if you had eaten better all of your life. It might interest you to know that the only difference between the Queen Bee and the rest of the members of the hive is the difference in the food she eats. I know that you don't want to be a Queen Bee, but you might like to move a little faster up the ladder of leadership, and this analogy will help you to see the importance of foods.

Food is the power on which we live, work, play and maintain true health. We don't want to grow old in the middle of life; we don't want a heart that starts too early to need the crutches of medicines, nor a stomach that has to be bolstered up on frequent doses of sodas and other aids. (Figs. 3 and 4).

What we want is the man and woman who can take it. One who has nervous stability, who is undisturbed by the noise and rush and pressure of a faster production program, who can make quick accurate decisions without tearing up an entire office staff to do it, one who can serve the problems of emergency calmly. (Fig. 5).

Figure 3

So what! You are what you are, and so once again you figure that you're up against "too little, too late". Nothing could be farther from the truth. The entire purpose of our national nutrition education is to make each of us conscious of the fact that Something Can Be Done.

It's just too bad that we can't get a replacement on the old heart and teeth and stomach and eyes. But we can't get replacements on a lot of other vital things either. So let's take care of the things we have.

We can start today, right now, each one of us to make the most of the body that we have. The right foods will help us to keep our teeth in better condition, our skins fresher and clearer, our hearts stronger, our inner organs functioning to the best of our ability. We can't remake them, but we can certainly make them better.

Figure 2

What do we mean by "better eating habits", and what are these magical foods that can do so much for us? Surprising enough, they are foods so common that we believe we eat them all the time. But we don't—not all of them and not every day.

As an adult how much milk do you get every day?

You might just start there with an analysis of your own daily diet. Milk is an essential food for the average normal person of every age. We can't eat enough other foods each day to supply for the body the calcium that it needs unless we get our quota of milk: 1 pint for each adult, 1 quart for each child. For children it is essential to build strong bones, straight legs, good arches in the feet, good teeth, and other essential body materials, blood and organs. As adults we need milk to keep these body parts in healthy condition and teeth sound and free from troubles.

So milk is the first food on the list given by nutritionists. Other than milk, *every day* we need:

Oranges, tomatoes, grapefruit, limes, lemons, tangerines or raw cabbage or salad greens . . . at least one of these.

Green or Yellow vegetables . . . one big helping or more, some raw, some cooked.

Other vegetables and fruits . . . one or two servings. This includes potatoes, beets, bananas, apples, etc.

Eggs . . . at least 3-4 a week, or one a day per child, cooked as preferred or in "made" dishes.

Whole grain cereals or bread (wheat, rye, cornmeal, oats, etc.) or enriched bread or white flour . . . at least two servings of these.

Meat, poultry, fish or cheese . . . at least once each day, and occasionally dried peas, beans or nuts.

Butter and other spreads . . . vitamin-rich fats, peanut butter and similar spreads. Count bacon as a fat, not as a meat.

6-8 glasses of water.

Check the foods that you eat each day against this list and see if *you* are "doing something about it." You can, of course, add coffee or tea as a beverage but they are not listed as foods.

The foods given above supply us with the materials which our bodies need for

* Presented to members of the Electrical League of Utah and other organizations.

building, repairing and maintaining themselves . . . just as each day the steel worker must be supplied with the materials from which he makes his products.

We need the minerals from foods for every cell in our bodies whether of hard or soft materials, bones or muscles. We need proteins (meat, fish, poultry, cheese, eggs, milk) with which to make, repair and keep in good condition all of our muscles, blood, inner organs, skin and all other soft tissues, so that we do not age too quickly. We need vitamins to give us the spark and zip in life, to make it possible for us to utilize all of the other things that we get in our foods. We get some vitamins and minerals from almost every food.

Most men avoid vegetables . . . "rabbit food." But may I remind you that such foods provide the sole diet of the powerful elephant and bull as well as of the fleet rabbit. We might well give a little more respect to this "rabbit food."

Figure 5

We also require some fats each day, and we must have water to regulate our body temperature and to use for the transportation of all foods over the intricate body system.

No one food value is more important than another. They must all be present and present together for good health, vitality and proper functioning. They must all provide some calories for our energy whether we are asleep or awake. In most cases when we resort to vitamin and mineral capsules, we admit that our bodies are in poor condition because of faulty eating habits. Let's get our food values from our foods, unless for some reason and under a physician's care we must supplement those foods with artificial reinforcements.

Good eating habits can be simply defined as the habit of eating these essential and protective foods every day and divided into at least three regular meals. And I do mean three meals and regularly.

Breakfast is important. Here again we show a great American deficiency. In the speed and other poor habits of living, we have given up breakfast as being a non-essential. This applies both to school children and to adults.

Such practice is bad all around. Breakfast is vitally important for us at any time when we must get up and get going on a day of learning or earning or playing. That doesn't mean a cup of coffee and a doughnut at mid-morning, but a breakfast that will give us self-starting ability at the *beginning* of the day. In a healthy America, we must make time for a healthy breakfast. One which includes fruit or fruit juice, whole grain cereals and whole grain or enriched breads, milk for cereal and to drink, occasionally an egg or bacon, coffee or milk to drink. This is one of the greatest corrections that we need to make in our eating habits as a nation. If you are going to be an efficient member of the great army of workers, start the day the way our fighting men do . . . eat breakfast. We all need "fightin' foods." (Fig. 6)

Good eating habits require that we eat all foods: no pets, no aversions. All foods are good for us, variety is good for us. Naturally, I am not talking about the poor fellow who is handicapped with allergies and poor education in the good manners of civilized dining. The people who do suffer from allergies need our sympathies, but don't let us put ourselves voluntarily into the same class with faulty selections and mental allergies.

For some people who cannot eat a great deal at one time, for those recovering from illnesses, for aged people, for people who work on shift until eleven o'clock or midnight, it will probably be wiser to divide the day's food supply into four meals, and take that fourth meal in light form of cereal or a milk dish just before retiring.

It isn't enough that we select the right kinds of foods for every day and arrange them into three or four regular meals. Foods must be carefully selected at market to be sure that they are fresh and crisp, not wilted. Wilted foods have lost food values. After buying, it is necessary that foods be stored properly to retain as much as possible of these food values, especially the vitamins. Some foods must be kept cool and moist, others cool and dry; some must be kept cool and in a dark place. There are reasons for all of these rules, though we don't have time to discuss them now. Arrange with your wife, mother or housekeeper to take a complete course in nutrition to get the details.

After we have taken care of foods up to this point, we must learn to cook in the modern, nutritious way so that we will not lose minerals and vitamins and other food values a few feet away from the dining room table. Fruits and vegetables should be cooked in a very little boiling water, in a covered utensil, and only until done. They should be served as soon as ready. Cooking water, no matter how little, should be served with the food or used in soups, gravies, or liquid cocktails. These are all points which the cooks in your families can learn in a nutrition class which is being given in your own community through your Civilian Defense or Red Cross organizations.

Figure 6

I don't need to remind you gentlemen of the amount of time and money which we lose in business every year because of minor illnesses such as colds, headaches, and others. That loss of man-days and efficiency is bad at any time, but is not to be tolerated in this period of war emergency.

We are going to have less doctors and nurses to take care of us civilians, because our men in service need them. And that's just as it should be. We are going to have less people to fill medical prescriptions. Because of these things, we must keep ourselves healthy and free from the need of these services.

Uncle Sam will take care of our fighting men. *You* will have to take care of yourself, and better balanced meals, more protective foods will help, along with some relaxation, exercise, recreation and plenty of sleep.

"An army travels on its stomach." So do we. A member of an audience once corrected me on this point, saying that an army travels and wins on its morale. A former war veteran rose to ask "what the h . . . the questioner thought was morale. Had the questioner ever heard of a starving army winning any wars or battles."

And that may be true enough. We have heard of retreats in this war, some of them due to lack of food. Part of military tactics is to starve out the enemy troops. Poorly fed troops are sick troops with little left for them to do but retreat.

You and I are not in the fighting uniform of our country, but we are part of the great Army of Workers who must remain on the job to produce the many things which our great fighting forces need. We, too, have had our retreats in strikes, time off for minor illnesses, inefficiency and slowed production.

Figure 7

One industrial survey made by the Gallup poll people last year between Nov. 24 and Dec. 30, showed a loss of enough man-days for minor causes to have produced at least 2 heavy cruisers, 448 medium bombers, 3,200 light tanks. That's what I call a whale of a retreat.

We can do something about it, each one for him-

self. We can start today. We can eat the right foods and remember that this is a job of skillful balancing (Fig. 7).

To use our national slogan *The U.S. Needs US Strong. Eat Nutritional Foods.* As part of the army of workers, let us tolerate no more retreats in production because of half-health.*

What About Parts and Manpower?

Dealers of San Diego pried into these trials of wartime service; here is what they found

IF anybody does anything about a dealer's wartime difficulties it is most apt to be the Bureau of Radio and Electrical Appliances of San Diego County. That's because San Diego, with its huge war production and military population has its difficulties sooner and more acutely than elsewhere and because too, the dealers are better organized to do what must be done, more used to working together, more alert to changes and adjustments. Whereas the same problems press themselves upon other dealers everywhere, this group does something about it.

What they do or plan to do surely is a guide to other dealers in other localities. In other regions the situation may not be as acute, but that is only a matter of time. Dealers can learn from San Diego what is ahead and what best to do about it. Therefore the following report of the intensive 10th annual conference and meeting of the San Diego Bureau, held Nov. 13, afternoon and evening, at which 125 men, representing 75 different appliance organizations took part, contains valuable information for dealers everywhere.

Following a general meeting at 3 p.m. in which problems concerning the War Production Board were discussed, the group divided into four sections of radio, refrigeration, laundry equipment and small appliances. A chairman and two discussion leaders presided over each meeting. They had been responsible for the preparation of a general outline to be followed, but no specific assignments whatever were made in advance. This was to insure spontaneous participation of as many people as possible. Likewise, assurance had been given that any material or subject matter, regardless of whether it was included in the outlines, was welcome. Obviously, material pertaining only to the section in question was permitted and attempts were made in all meetings to keep the discussion as close as possible to the general problems connected with appliance service.

The personnel of each section meeting was made up principally of service dealers, but manufacturers representatives, distributors of parts and supplies and at least one utility man attended each group. Discussions were uniformly spirited and without exception, carried right up to the time of adjournment for the dinner meeting. The general aim was to picture the actual conditions surrounding appliance service and repair in that territory, so that possible solutions might be considered. In some instances, definite suggestions for relief were made. In others, the problems were merely outlined so that further study might be made.

Radio Section

Chairman: Elmer B. Hazie, S. D. Auto Electric Co.

Discussion Leaders: Ted Reser, Western Radio & Electric Co.; E. R. Dickey, Jr., Guaranteed Radio Co.

Availability of Parts and Tubes

Without relief, certain types of tubes will soon be exhausted locally. Partial relief may be obtained by substitution, though it means changing sockets. The bureau was urged to encourage dealers who make substitutions and circuit changes to affix stickers on sets, advising what change has been made from the original circuit (for the benefit of other service men). Generally it was agreed that the tube situation is more critical here than that of parts. Salvage possibilities were discussed. One dealer reported finding 200 usable tubes in the scrap pile. Effect of PD-I-X arrangement, under which all distributors file for advance needs, is still uncertain. Local distributors are crippled by inventory limitations, low percentage of order deliveries because factories are loaded with government tube orders. Pooling of parts was discussed. It was agreed that distributors are best equipped to make a country-wide survey of dealer inventories for it would be well to know approximately what the composite parts and tube inventory might be.

Over-Counter Sale of Parts, Tubes

In view of critical shortages, some limitation seems necessary to the former practice of selling parts and tubes over-the-counter. Wherever possible, dealer should make certain that such part will actually put a radio back in service. Otherwise these sales might better restrict service to complete sets brought in by customers for repair.

Pick-up and Delivery; Zoning; Customer Abuses

It was agreed that it is of utmost importance to encourage bringing in of every possible set. Only in necessary cases should pick-up and delivery be continued. Zoning of calls by districts is essential. Distant calls should be avoided when closer dealers are available. Many dealers report growing difficulty with overlapping calls. Customers are apparently leaving home calls with several firms, hoping to have first man there do the job. Two solutions are: (1) Always inquire if any other dealer has been called. If "yes", politely decline the listing unless assurance is given that other calls have been canceled; (2) Remind customer there will be a charge for the trip, regardless.

Experience Under Ceiling Price Regulation

Most testimony indicates dealers will be able to get by on March ceiling prices, (unless labor costs advance further), by volume methods, watching costly outside calls, streamlining operations. Feeling was general that OPA would eventually make examples of any wilful violators.

Consolidation, or Pooling of Service Facilities

A suggestion that a central service station handling not only radio but all types of service might be set up, possibly under utility sponsorship, drew spirited discussion. Proponents argued it would eliminate duplication, make for more uniform and effective service, etc. Opponents could not see any advantages in the suggestion. No recommendation.

Manpower Situation—Training Program

Despite parts difficulties, manpower still ranks as the number one problem. Some relief may be expected from the training program in cooperation with the vocational school. Several graduates already are working with dealers. Total registration in radio classes is now 75 with another class of 25 to start immediately. Even though most students do go to aircraft plants for radio work, this relieves pressure on the present shop personnel. Need at the school is for more dealer trade-in sets to repair. Arrangements will be made to get them.

Refrigeration Section

Chairman: Paul A. Du Pont, Walkers.

Discussion Leaders: Clarence E. Anderson, Anderson Refrigeration Service; Elton S. Bailey, Refrigeration Equipment Co.

Parts and Supplies

The situation is acute both as to wholesaler and dealer stocks, particular-

* May I suggest the reading of the report of the Committee on Nutrition in Industry. Circular No. 10. The Food and Nutrition of Industrial Workers in Wartime, National Research Council, 2101 Constitution Ave., Washington, D. C.

ly for domestic refrigerators. Distributors are expected to build up some commercial stock, under PD-1-X, but there is no relief as yet, for government orders are coming first. Domestic parts are not replaceable as yet. Even under AA-2 ratings, wholesalers report very slow parts delivery. There are some substitute materials but they have helped but little. Locally, the motor situation outlook is much more secure than for other replacement parts.

Personnel—Resolutions to WPB and Manpower Board

The parts situation may be troublesome but manpower is the real problem. Every firm is short-handed. A poll of firms attending indicated the average shop had lost 35% of service personnel since two years ago. Replacements are almost impossible to secure. Training program was discussed, but the feeling was that more consideration should be given before any action is taken. In view of manpower and parts problems, the vitally important nature of refrigeration maintenance, both commercial and domestic, was discussed at length. It was decided that a resolution be directed to the WPB on the parts situation and to Manpower Board on protection of remaining service personnel. Such a resolution was prepared and was presented at the evening dinner meeting, and later sent to the agencies concerned.

Service Calls—Zoning—Specialization

The public is taking advantage of dealers by phoning several with the expectation of getting early service. It was agreed that care should be taken to ascertain if a call has been placed with any other dealer. If so, it should be refused, unless the previous call has been canceled. Zoning of service calls was considered highly advisable. Under no circumstances should special trips be made without taking care of others in the vicinity. Mileage limitations should be established, with closer dealers doing the work wherever possible. The suggestion that various shops might specialize on certain brands, was made. This was left for future consideration.

Ceiling Price Experience Regulation No. 139

Some difficulty is being experienced by local firms in carrying on under price limitations imposed by Regulation No. 165; relief has been applied for, due to labor increases subsequent to the original order. It was pointed out that streamlining service practices as outlined might help some to meet increased costs. Used Refrigerator Ceiling Price Regulation No. 139 has been found entirely unworkable. Reconditioning under this schedule is practically nonexistent. Hope was expressed for early revision of this order.

Laundry Equipment

Chairman: Lou Wiese, Wiese's Ltd.
Discussion Leaders: Glenn Dutton, Dutton's Radio Store; Harry Franz, Harrington's.

Parts and Supplies

Gradually, the parts situation is tightening for dealers and wholesalers. Parts for some makes no longer are manufactured, causing most of the present difficulties. Fabrication was considered, where machine tool equipment is available, although care must be taken to obtain priorities for critical metals such as brass, if used. Reclaimed rubber wringer rolls are causing untold grief. No guarantee is given by the manufacturer. Some give out soon after installation. It was agreed that the dealer cannot replace free, and so should not guarantee them. The problem of replacement of cords and switches is becoming more serious. Possibility of pooling parts was considered but not looked upon as a practical solution at the moment.

Maximum Price Regulation No. 165

Consensus was that the average dealer probably could continue to do service at a fair profit against the March ceiling prices, if he used every possible means to cut out non-essentials—unless labor and materials are further increased. Notice was taken of reported exorbitant service charges on the part of two or three "fly-by-night" organizations. It was declared that such tactics adversely affect legitimate dealers and should be subject to OPA regulations.

Outside Calls—Zoning

A growing tendency was noted to urge customers to bring in washers and ironers, if at all possible. A surprising number appear willing to do so. Dealers should further restrict outside calls to reasonable distances from the shop. Whenever possible, customers should be referred to a dealer close at hand. Certain territory, such as the beach area and Linda Vista have no washer service. Dealers are already cooperating by calling each other in relation to these districts. Still closer contacts will make it possible for one dealer to handle all such calls that may be received for these districts during a given week. The Appliance Repair Directory of local dealers and authorized service stations has been used most effectively in bringing about closer dealer contacts with each other.

Manpower

The manpower problem is still number one on the list of service difficulties in this division. Losses have been very high and experienced replacements a virtual impossibility. Success was reported by some in using part-time high school boys who seem to learn the repair routine rapidly. Consideration was given to the need for establishing a training class either in the high schools or vocational school for this type of repair. Further study was recommended. It was unanimously felt that laundry equipment service is highly essential, and that means should be found to establish this essentiality with the Manpower Board and the WPB.

Small Appliances

Chairman: Sam L. Hall, Elec. Supplies Distributing Co.
Discussion Leaders: Jerry Heilbron, Heilbron Electrical Co.; J. F. Zweiner, Zweiner Electrical Co.

Available Stocks—Alarm Clocks

Some stocks of miscellaneous small appliances are still available but most notable lack is electric irons. None are left here. Every effort should be made to induce WPB to allow manufacture of a Victory iron. All stocks of old irons should be worked over with view to keeping as many as possible in service. Thousands of alarm clocks, electric and otherwise, are needed by war workers here, and none are available. It was suggested that publicity might be used to urge those having alarms not needed, to get them into hands of war workers. This was referred to the advertising committee for consideration.

Parts and Supplies

Manufacturer policies were first outlined. Eventual replacement can be expected on damaged parts returned to the factory or its agent, but the problem lies in lack of a revolving stock. One manufacturer eliminates costly delay in transportation of damaged parts by permitting dealer to sell to junk man, then send receipts for critical metals so sold to manufacturer who credits that as a "scrap bank" for that dealer, against which materials or parts of similar critical nature may be issued. Recommended that this idea be considered by other manufacturers. It was agreed that actual saving of critical materials would result if dealers were allowed to buy cord in bulk rolls. Now, losses result because dealers are forced to buy cord sets and remove heater plugs for direct connection to appliance, accumulating heater plugs that can't be used. It was felt that every effort should be made to find a way to have armatures wound locally without having to send them to Los Angeles.

Ceiling Price Experience

Difficulty is being experienced by some in making a profit from small appliance repairs, at March ceiling prices. Principal reason lies in increased cost of labor. Every effort must be made to speed up the general tempo of service and to use care in eliminating all unnecessary expense.

Manpower Situation

Service personnel for small appliance

repair is growing more difficult to retain. Replacements present a problem. Experiments have been made locally with women and while they have the ability to acquire service technique reasonably well, trouble has been experienced with keeping them. They soon want to leave for war work at wages higher than those existing in appliance repair work. All agreed, however, that dealers must not become discouraged and should continue every effort to acquire needed personnel.

Evening Banquet

The evening program was designed to include subject matter of general interest to all. Vice-president Paul A. Du Pont presided in the absence of President E. W. Kinmore, due to sickness. Secretary J. Clark Chamberlain served as toastmaster. The meeting opened with appropriate recognition of the tenth anniversary of the Bureau of Radio and Electrical Appliances, and included a brief review of some of the organization's most outstanding accomplishments.

To give everyone an opportunity to know what had happened in the other fellow's section meeting, brief reports of each were given by the various group representatives. Then followed a review of the Bureau's cooperative advertising activities of the year to date conducted by committee chairman Elmer B. Hazie. The highlight of this report was a preview of the 64 page "Care and Use" booklet covering all home appliances and sponsored jointly by the Bureau and the San Diego Gas & Electric Co. Plans for distribution of the first 50,000 copies in cooperation with the women's division of Civilian Defense were outlined by F. M. Raymond, the advertising adviser.

A. E. Holloway, vice-president, San Diego Gas & Electric Co., contributed numerous observations as to the efforts being made in this territory to cope with the service problem in general. He expressed great satisfaction over the manner in which members of the appliance industry and the utility had been able to work together so effectively through the means of the bureau, and pledged all possible assistance in furtherance of mutual interests. He also presented a brief report of the Victory range situation, including the findings reached by the bureau in a survey of the manufacturers designated to make this type of range. It appears the prospect of obtaining range stocks to meet local needs is not bright, but hope was expressed that with the help of the War Production Board, some solution to this impending problem may be reached. Local range stocks are expected to be exhausted by January.

The manpower situation, nationally and locally, was covered by Roy Ferguson, head of the newly appointed San Diego Manpower Board. His picture of the immediate needs for both skilled and unskilled men and women for local war work left little doubt that the chief problem will continue to be that of personnel. Ferguson, however, gave encouragement to the thought that some of our appliance service men may be considered essential to the war effort. He replied, under questioning, that as yet no compulsion whatever is to be used in attempting to divert mechanical workers from civilian to war pursuits.

The current interest in the gasoline rationing situation, and in the regulations surrounding the use of commercial vehicles was met most effectively through the explanations of George C. Ray, chief gasoline rationing representative of OPA, and William Macomber, commercial vehicle specialist. Countless questions arose following these presentations and all were answered with directness. From these answers, it appears that at least the gasoline and tire situation for the average dealer from the standpoint of appliance service, is not to be nearly so dark as had been feared.

Free Lamps Stimulate Durationizing

Third phase of PG and E program creates work for graduates from its second phase repair schooling

LIKE the story of the two hunters lost in the woods and without food—*one, the optimist, says "if we had some ham, we could have ham and eggs, if we had some eggs"*—the "Durationize" plan of Pacific Gas and Electric Co. has evolved into a similar situation. When first the company advertised to the public advising it to "durationize" its appliances, dealers handling service work were swamped and found themselves short of help. In order to provide help, repair service schools have been inaugurated. Now to insure work for those who take the repair courses an added stimulant has been given to the Durationize program to bring more appliances in for repair or consign unrepairable ones to the scrap drive.

Previous accounts in these columns have described the original Durationize program. Likewise the intention to start up a training program has been announced. Some of the latter details are significant to any other region contemplating similar activity on behalf of dealers.

By the beginning of October, 700 dealer service stations had been accredited by the manufacturers as authorized stations for repair of their appliances under the plan. A survey was then made of 294 of these dealers to find out their requirements in manpower. Of the 294, 96 wanted extra help on an average of two apiece, or a total of 180. Preferences for types of people were interesting. Forty-five wanted handicapped men, 115 wanted men over 50 years of age and only 20 wanted women. The survey also took up with them the wage scale they were willing to pay. This scale ran from 50c to $1 per hour with some difference in various communities. It was interesting that the wage offers for women help were lower than those for men.

This survey was conducted in San Francisco, Oakland and the East Bay, Sacramento, the San Joaquin Power Division, San Jose and Stockton.

On the basis of these surveys, the training program was set up. First school was opened Oct. 5 in San Francisco at Samuel Gompers Trade School. Two classes of 25 people each were opened. The first runs from 7:30 a. m. to 11:30 a. m. five days a week. The second is a night class from 7:30 to 10:00 p. m. on Monday, Wednesday and Friday. Approximately half of the class are women. A waiting list of 300 applicants was obtained in answer to advertisements placed in local newspapers and a selection made of those most likely to be employed. Some of the day students are being employed by dealers already on a half-day basis.

In Oakland, the Central Trade School opened a class Sept. 12. It has in it 33 people of which 26 are men and 7 women. A waiting list of 30 applicants was lined up. Some of the class have already been placed as competent to carry on.

In Fresno, the evening high school has been used for a class of students from a radius of 15 mi. from Fresno. It began Oct. 5, runs from 7:00 to 9:00 p. m. on Mondays, Tuesdays and Thursday nights. The class has 13, of which two are women. In Sacramento the evening high school has a class running from 7:00 to 10:00 p. m. daily which began Oct. 12. In it are 28, of which two are women. This class has a waiting list of 60 of which 20 are women. The first class was selected to fill the stated needs of the Sacramento dealers

and a second class may be started later.

Summarizing, there are five classes under way with 89 men trainees, 35 women and a total of 124 with additional applications of 390. In Oakland the dealers themselves have visited the class and interested themselves in it. In that class the students are let out as fast as they can qualify. In Stockton a class is being organized and one may be organized in San Jose.

Another interesting side light was that when applicants were told that they were expected to take a full time job if they took the course, one third did not return, indicating they were merely interested in a general education. In all instances, classified advertisements in the newspapers have been used to recruit applicants.

Mechanical aptitude tests are given before registration and certificates awarded to those successfully completing the course. No tuition is required.

The course runs approximately 80 hr. and covers the following subjects: fundamentals, 6 hr.; how to test circuits for breaks, 4 hr.; cord repairs, 4 hr.; soldering, 6 hr.; acetylene torch work, 6 hr.; electric welding of small parts, 6 hr.; types of fractional h.p. motors, 4 hr.; checking motors, 4 hr.; principles of the refrigeration cycle, 6 hr.; characteristics of common refrigerants, 4 hr.; shop practice, 6 hr.; followed by specialized training on washers and ironers, vacuum cleaners, small appliances, and refrigerators. This prospectus was worked out in collaboration with the educational authorities by Jared Hill of PG and E.

The training program is sponsored by the Northern California Electrical Bureau and administered by it. However, PG and E gives its full cooperation and implements the promotional part of the program. According to Bert Reynolds, manager of domestic sales, the program required the follow-up of the original advertising with the repair schools and also now the third step, the stimulant applied to the Durationize program.

This stimulant is in the form of the lamp premium, announced by O. R. Doerr, general sales manager, Oct. 1. Speaking of the plan at the PCEA conclave, Doerr declared the company felt it was necessary to keep customers constantly aware of the service provided by their electrical appliances throughout the war, not only that they continue in use, but that the market for new ones be kept alive for after war is over.

In the "Free Lamp Bulb Durationize Certificate Plan", every customer of the company was mailed a certificate with the October bill. On it was explained that if the customer had an appliance needing repair and would take it to an authorized service dealer to be repaired, a free lamp bulb would be given. Those appliances no longer fit for use which could be turned into the scrap drive would also be honored with a free lamp bulb. Procedure was worked out so that even those who do not handle lamps could sign an authorization upon receipt of the appliance and the customer could redeem the lamp at a PG and E office.

To assure graduates of classes such as this at Samuel Gompers Trade School, taught by Walter Heston, of employment opportunities in appliance repair service the free lamp bulb offer was made to have customers bring in appliances for reconditioning

Cooperation of the lamp companies was secured and a sticker provided to be affixed to the carton containing the 100 or 150-watt inside frosted lamp given in each case. This sticker, attractively printed in yellow, orange and black, had the following words: "Adequate lighting is essential to wartime living. Use normal light in your home. Shade windows which are visible from the ocean." Window stickers and counter cards for dealer use were also provided with similar wording. The plan was in operation until Nov. 30.

At first a little reluctant, the dealers upon having explained the entire purpose of the plan, have been eager to take it on, according to O. E. Rush, handling the organization of the program for PG and E. This is said to be the first program so far organized to carry through these three phases of the situation. Following it, a survey of the availability of repair parts will be conducted and help given in this respect wherever possible.

An unusual help offered by the Northern California Electrical Bureau to dealers has been the establishment of an advisory council made up of manufacturers, wholesalers and industry representatives to advise with dealers upon their financial and personnel problems. Any dealer who feels a need for counsel in adjustment to the difficult times can arrange a meeting with these advisors on a purely informal basis and discuss the problems he has in complete confidence. This in a way is a "medical clinic" which may help many a business to survive.

Postwar Appliances

"Merchandising Division" is no more for the Westinghouse Co. The name has been changed to the Electric Appliance Division, it was announced by J. H. Ashbaugh, manager of the Mansfield, Ohio, and Springfield, Mass., plants.

In announcing these changes, Ashbaugh made predictions of postwar business which are different from those previously made by other merchandising leaders. "Introduction of completely revolutionized designs cannot be expected the day that peace is declared, or within a few months or even a year thereafter," Ashbaugh explained. "Plants now converted entirely to war production will require time to convert, re-tool, and put into effect new model changes. To expedite conversion from war economy to peace economy without seriously interrupting employment levels, it will be necessary first to resume production of models which were discontinued this year when the end came to civilian goods production. Any revolutionary design changes, based on new war born techniques and embracing the dreams and ideas of modern research, will by necessity be added gradually as they can be developed and put into production."

He predicted drastic changes in domestic refrigerators because food storage requirements may have changed. Dehydrated, concentrated and frozen foods may cause refrigerators to provide faster freezing and enlarged capacity for frozen food storage. Washing machines, too, will probably go completely automatic.

NECA Protests OPA Order 251

Other WPB and OPA orders on wire, repair parts, vacuum cleaners; outdoor Christmas lighting banned

LONG promised, the OPA maximum price regulation specifically designed to cover the construction industry was issued Oct. 30, with Nov. 5 as its effective date. Quick on its heels the National Electrical Contractors Assn. entered a formal protest and a request that the new MPR 251 be suspended until its protest may be heard.

MPR 251 covers every type of construction from a repair job to building Grand Coulee dam. It gives three formulas; for jobs not in excess of $500, sales in excess of $500 on a cost-plus basis, and jobs over $500 on lump-sum basis. Exempted are jobs for Army, Navy or governmental agencies which have been *certified with OPA* that they are subject to renegotiation.

For less than $500 jobs the contractor is permitted prices for the same or similar work in March plus the actual increase in labor cost rate between March and July 1. Cost-plus jobs over $500 must submit a report to the nearest OPA office giving actual cost of materials, labor as of July 1 rates, other direct costs, margin of overhead that is supported by records, and a reserve for contingencies. For lump sum jobs a report of similar *estimated* costs is due 10 days after work starts, a second report of *actual* costs, 10 days before the job is finished, and a certificate of compliance after the job is done.

NECA's protest is that 251 is not in accord with the Emergency Control Act in that contractors do not sell commodities as such, are selling skill and experience as does an architect or engineer. It claims 251 to be inflationary rather than otherwise in that it increases costs, which must be added to the price, and that its complexity will tempt governmental agencies and private owners to hire day labor and buy materials themselves rather than wait for the delays which 251 will cause. It further charges 251 is discriminatory, is unworkable as to labor cost control, invades the contractor's trade secret—his estimating procedure—and because most contracting is intrastate, is unconstitutional

As to using a pricing service, both to estimate and to bill for work without going into detailed costing (a procedure many contractors have used as a convenience especially on time-and-material work), an interpretation has been given NECA by contract service section of OPA. Section 1397.59 allows for use of special pricing methods and contractors who wish authorization of such a special pricing method should write to OPA requesting permission to do so, making the explanation explicit. OPA will advise whether or not such a method is approved.

Renegotiation Revamped—Wire Frozen

Changes in the law permitting renegotiation of War and Navy Department contracts were made in the Revenue Act of 1942 which remove the unfairness from it. It sets final dates, statute of limitations, provides for overall renegotiation, permits voluntary cutting of excess profits, allows an offset in the payment of taxes. Contractors whose aggregate sales for war purposes are less than $100,000 in a fiscal year are exempted.

Copper went under even more drastic restriction early last month, so severe that copper for any use in building has been reduced to practically zero and copper products in stores, chain stores, warehouses or contractor stocks may be acquired by the government and remelted for war use. With it wire order M-9-a was amended to require an AA-5 or better rating instead of A-1-k before wire can be furnished. There is even some doubt that a dealer should sell at retail short lengths of lamp cord he has in stock. He will not be able to replenish stock in any case.

Another western wholesaler had a suspension order served on him last month, J. B. Roxburgh, Crescent Electric Co., San Francisco, for selling wire in violation of the wire preference orders.

Maintenance and Repair

Need to keep the nation's civilian economy in a healthy condition, recognized a long dispute between civilian and military leaders, ended when WPB authorized use of a top rating of AA-1 for essential repair and maintenance. Not all are to get top rating, but it is significant that on the industrial list safety switches, circuit breakers, magnets, motor-generator sets and other items of motor and control equipment are added to the list.

It is likely too that some material will be made available for repair parts for some household appliances, probably refrigerators, ranges, irons and washers.

Vacuum cleaners, new, were frozen in the hands of manufacturers, wholesalers and retailers on Nov. 9 until Dec. 31, in order to determine the quantity needed for military and lend lease needs, but were unfrozen for dealers later in the month. Second hand cleaners were not affected.

No Christmas Lighting

WPB on Nov. 9 asked that America forego all outdoor decorative lighting this Christmas even in areas not under lighting restrictions. The request was explained as a means of saving electricity and fuel. Indoor lighting, in homes or stores, is not affected. The dimout had already ordered such lighting out this year in the restricted lighting zone, but Rocky Mountain cities of Denver, Salt Lake City and Ogden had planned modest Christmas lighting.

Free service of any kind, either by utilities to customers on their appliances or in replacement of fuses, or by dealers or distributors in connection with any commodity, are interpreted by OPA in a manual of interpretations, to be part of the maximum price and to abandon such free service without a cut in rates or price is considered a violation.

Controlled Materials Plan

To replace the priority system, a controlled materials plan was announced Nov. 2 by WPB vice-chairman Ferdinand Eberstadt. It will go into effect the second quarter of 1943. Meetings to explain it will be held in San Francisco, Dec. 1; Los Angeles, Dec. 4; Portland, Dec. 8, and Seattle, Dec. 11. Reports will be required before Jan. 15.

● A 16-PAGE BOOKLET, *Keeping the Blackout Outside Your Home*, is available from Westinghouse Lamp Division at 5c per copy. Written by Miss Myrtle Fahsbender, Westinghouse director of residential lighting, the booklet is directed toward the women of the country and is designed to help them select economical blackout methods and materials. A lecture with lantern slides, *Keeping the Black-Out and Better Light-In*, is available free of charge for use in conjunction with the booklet.

● TO HELP CUSTOMERS keep their electric appliances working for the duration, Utah Power & Light Co. has established a "Fix-It Shop" at Salt Lake City, recently moved from the Main Street store to its service department building. A recent advertisement telling of the move, informs that while appliances will be received still at the main store, by taking them direct to the new headquarters, customers can expedite their return, avoid parking problems and talk with the repairman.

Electrical West

Business Guide

For Electrical Dealers and Salesmen

G'bye Now

This is no time to leave you flat, is it? Certainly if a dealer or salesman ever needed help and advice it is during these times of change. Yet never before has there been so little that can be done as far as appliance merchandising is concerned.

These Guides were honestly conceived and sincerely carried along to do a job. They were to be intensely practical, to fit this particular field of yours, to be human and helpful. As far as possible they were to be real; no hooey, no daydreaming, no false advice or impossible suggestions. If now they are set aside, with the appliances they teamed up with, for the duration, it is because that is the honest, practical, sensible thing to do, too.

Mind if we reminisce a little in saying au revoir but, we hope, not adieu? These began in 1935, just as we were emerging from the depression, as "Sales Talks that Sold Appliances," fundamental, tested, selling method stuff into which the real sales appeals of these appliances—from the customer's point of view—were arranged in a sample sales talk. These monthly "Talks" were sponsored by a group of utilities which were sincere in their desire to develop dealers into successful sales organizations for the dealers' sake as well as their own.

That September, 1935, there blossomed the first Electrical West Appliance Sales Guide, a 36 page manual containing, in concise selling statements, the benefit appeals of each type of appliance. Its success led to the expansion of the monthly Sales Talks into monthly Appliance Sales Guides, beginning Jan., 1936. The familiar "Bill Smith," master salesman, continued in 1937 with "Sales Talks that Hurdle Sales Resistance." In 1938 a new series, "When the Prospect Says: 'No!' ", followed. In 1939 the Sales Guide told "What to say, what to do, and how" in the selling of appliances.

Briefer and keyed to the handling of a particular sales situation or resistance was the 1940 series. This was punched up with color and it followed the theme that "Selling is fun when you know your stuff." (and it is) in 1941. Late that summer it began to be evident that appliance production would be curtailed severely to turn more materials into lend-lease war production, and Dec. 7 launched the nation into all-out war which had no place in it for luxuries. Unfortunately appliances were so classified.

During this past year, 1942, the Guide became more a Business Guide than a Sales Guide, a helpful source of advice and encouragement in meeting the violent adjustments of our first year of war. Dealers remaining are shifting now to other lines of still available wares. Watching trends, seeking the soundest survival ideas for dealers and salesmen, the Guide brought a worthwhile basic feature, the series of articles on business management by Ken Hampton, which conclude with this issue also.

It has been fun, combing the selling world for ideas and methods that could be of practical help to you, just as selling itself is fun for those who like it. Let us hope that it will not be long before peace will bring a return to the fun of selling again, and with it, may we hope, the fun of providing you with a Sales Guide that is an arsenal of practical sales help.

With Electrical West's sincere good wishes, both for the holiday season and the duration, may we add,

We'll be seein' you,

BILL CYR
Business Guide Editor

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December, 1942

What Future?

It's an old Chinese custom to clear out all debts before beginning the new year with firecrackers. It's an old Indian custom to gaze into the crystal ball to foretell the future. It's an old American custom to try to get from behind the 8-ball and keep the Indian sign off the business. Mix them all together and what have you got for 1943? Plenty!

Before coming to any conclusion, as you look over your own prospects, whether to be or not to be in business next year, we've scouted the opposition for you as General Clark did North Africa so that you can take these factors into account in your plans. These are not recommendations. They are what you might call "military intelligence" of what lies ahead and from which you can plan your strategy and conduct your tactics.

First—what has the government and its planners in mind for retail business?

Construction of new war production plants will level off and all materials will be turned into production first of war goods, and second, a restricted list of absolutely essential civilian goods. This will probably include food, clothing, furniture, some hardware and housewares, medicines—possibly a Victory model range, ice box (no mechanical refrigerators at all), electric iron, perhaps washer. Latest word from WPB indicates that some material will be made available for parts for repair of refrigerators, ranges, irons and possibly washers.

Obviously there will not be enough goods of any kind made to support the firms now in business or wishing to remain in. A special committee of the U. S. Senate given the job of studying "Small Business Problems," issued a report in September on "Retailers Face the War." In it the experience in England is told in detail and it may well become the pattern for retailing in this country, especially if the war continues long. So here is what you can expect to see:

1. **Permission to certain manufacturers** to make a limited amount of civilian goods—the Victory model range for example. Brands will not be differentiated.

2. **Contraction of the number of stores** to concentrate for efficiency and saving in tire mileage. Some form of assistance in liquidation may be offered by the government to speed it.

3. **Limit to the number of new entries** into business on a permit of necessity to serve some otherwise unserved community, such as a new war housing area.

4. **Selection of the store** best fitted to serve a neighborhood on a basis of efficiency, location, manpower and facilities.

5. **Limitation on the lines** each can carry so that available goods will not be spread too widely for anyone to sell and make expenses.

6. **Rationing of essentials,** mostly food, but possibly other articles too.

7. **A coupon system** on some commodities, such as clothes, to permit some choice of kind and style but limit total amount.

8. **Possible registration of customers** and assignment to certain stores to even up distribution and eliminate cross hauls, needless chasing around to shop, and duplication of stocks.

9. **Some subsidies,** possibly, to keep essential manufacturers or dealers alive so that essential service can be provided even if unprofitable in reduced, restricted volume.

10. **Reduction of service,** and elimination of service as a means of competing with other dealers. With limited and designated stores, registered customers, restricted stocks and rationing there will be no need to compete.

11. **Price regulation** to hold ceiling prices firm. Increased costs are to be absorbed and compensated for by reduced services, such as delivery, wrapping and packaging, accepting returned goods, sales on approval, pick-ups, call backs, C.O.D. sales, credit sales, and advertising and promotion.

Not a pretty picture, is it? Regimentation of business, isn't it? But war has regimented our young men, is regimenting our workers and women, and if it is necessary to regiment business, we can take it. All the more reason to win back our freedom. Like

induction, it won't all happen at once, and all of the foregoing may not be required. This pattern comes from Englands's four-year experience at war.

In view of such an outlook many a dealer will want to decide for himself what is the best course for him, to stay in or to close out. In deciding that there are certain factors to consider, beside that of his own draft status. An intelligent decision will be based on his personal inquiry into these:

1. **Availability of other merchandise** lines to sell for the duration, and the necessity of learning the selling methods of those lines.
2. **Value of his name** and establishment in the community and the cost of re-establishing it.
3. **Whether it is worth losing** $2,000 or $3,000 a year, (if it would cost that) to remain in business through a 2 or 3 year war in order to be on the ground when it is over as a going concern (if he has the money to lose on such a gamble.)
4. **What running expenses** would be if cut to the absolute existence level.
5. **His service and repair business**—is it the one likely to survive in his town, considering all the dealers', especially in view of parts and manpower shortages?

In deciding which way to turn, in or out, a realistic study of such questions as that will guide the decision to the soundest conclusion. With clear thinking along such lines all the fear and uncertainty of the problem begins to break down into small parts that can be handled easily by themselves.

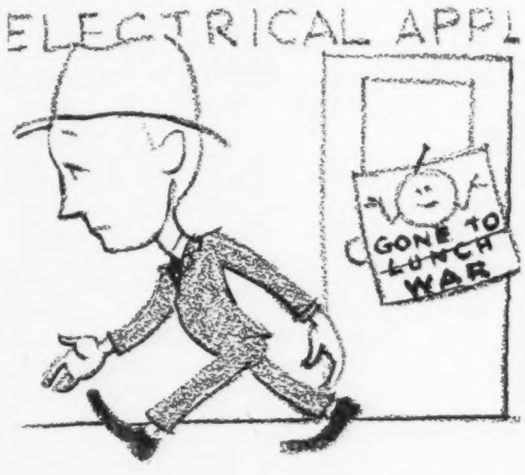
If the decision reached is to sit this one out, to close for the duration, there are some definite questions to be answered too. How best to liquidate should be decided. These are points to consider:

1. How shall the stock be sold?
   a. A closing sale, with prices reduced to clear,
   b. Sale of stock to a competitor in town,
   c. Sale to someone out of town so as not to disrupt the town trade by a close-out at a sacrifice. The reputation of the store and the hope of return to business in that town is involved in this decision.
   d. Sale of the entire business to someone else, if a buyer can be found.
2. How the accounts receivable will be collected,
   a. By the dealer himself (somewhat difficult perhaps without a central business location any more),
   b. Sold to the bank or finance company to collect, on major accounts at least.
3. Disposal of the lease, fixtures, equipment, etc.

On the other hand, if the decision is to remain in business, even at a possible loss for a year or two, in order to keep the name of the business alive and be on the ground when peace comes to take up the upsurge of sales that will come from a product-starved public, there are some thoughts to consider in making the best possible bid for survival:

1. **What other lines** can be taken on now before a stop is put to the adding of lines? There are housewares, crockery, woodenware, glassware, waxes and polishes, insecticides, garden supplies, some furniture, children's furniture and toys, gifts, souvenirs, jewelry.
2. **A service department** organized to handle repairs despite the shortages of experienced mechanical help and of parts. This involves training of women, of handicapped and over-draft age men, or doing repair work personally. Parts may have to be patched and even made. Ingenuity will count more than anything else. Shortcuts and streamlining may be necessary to save time so that this work can be done at a profit under the price ceiling on services.
3. **Adjustment of rent** or lease by frank discussion of the situation with the landlord and consideration of the increasing number of vacancies, the restrictions on stores.
4. **Consideration of moving in** as a concession in a big store, or market, or location in a marketing center to which customers will come to buy staples and provide their own transportation to a large extent.

As a parting bit of sound advice: your utility is honestly interested in your business and success. Of recent years this has been proved repeatedly. Cooperation with your utility throughout the war will help it to help you get off to a flying start when the war is over and selling begins.



PUGET SOUND POWER & LIGHT CO.
PORTLAND GENERAL ELECTRIC CO.
CALIFORNIA OREGON POWER CO.
UTAH POWER & LIGHT CO.
IDAHO POWER CO.
ROCKY MOUNTAIN ELECTRICAL LEAGUE

Business If You Please

Concluding this series of good sense articles on business management

By Ken Hampton

MERCHANDISING still is fraught with all the romance of rural trade. True, we sometimes lose the thrill of its world wideness in trying to fill our necessary place as merchants in a distribution system that has become highly complicated by manufacturing and population concentrations. Still, it is there, the bringing of goods from all corners of the universe to the finest people in the world, our customers.

The fact that we now bring not just foodstuffs—for instance, dates from the Orient; or clothing—such as furs from Alaska, but complicated machinery worked through many complicated processes from mines and mills, intensifies the romance that surrounds our goods. Now much of our merchandise is the story of people—many people living and working under vastly different conditions; people who mine, people who operate railroads, ships and trucks; people who work in big factories; people who do research work and long-time planning. Today more than ever before our products are the combined results of man's efforts. The merchant should trade on this fact in his selling and advertising.

People are always curious about other people. They like to know how they live, how they work, what they think and what they look like. These things are all wrapped up in our merchandise. The story should be told to our customers. It will please them and make them proud of the merchandise they buy from our store.

The successful conduct of the merchandising business depends upon following closely a few simple rules that revolve primarily around people. For the most part these rules have to do with pleasing people and so are just the ordinary rules of friendliness, courtesy, honesty and fair dealing. It is the wise merchant who holds his organization strictly attuned to the prevailing characteristics of his community, be it agricultural and conservative, or mining and extravagant, or any gradation in between. Peculiarly, however, a smile and friendly greeting may weigh equally in any business success.

The future of merchandising success, your success and my success as individual merchants and the success of our stores, will depend upon how well we can use the experience gleaned from our own present and past experience and the experience of our associates and those who went before us. This is why merchants like to talk trade so incessantly with each other when events throw them together.

It has been said that "nothing is constant but change." The distribution of goods to consumers is constantly under pressure of competition and public criticism to become more efficient. By concentrating our thoughts on the job, improvements can be made. As we think on a subject we attract all the necessary ideas for its accomplishment. Thoughts are materials to work with. How well we use these materials depends upon the concentrating of wide experience and intense thought upon single subject. In our minds we must judge future events in the light of past experience.

This experience has proved to us that important to all merchandising is pleasing people—pleasing all people all of the time—because all people, employees as well as the people who sell us our goods, are not only potentially our customers, but are walking advertisements telling the world about us. They either like us, our store, our merchandise and our way of doing business or they don't and they tell their friends about their likes or dislikes to our benefit or detriment.

Whenever a merchant pleases a person, his business grows a little—when he displeases it shrinks a little. For that reason we presume to close by saying that **the cardinal rule of merchandising success is to find the things that please people and do more of them—and to find the things that offend people and do less of them.**

Originally it had been intended to reprint this series of basic business articles in booklet form to be given by dealers to new employees as a means of telling them in an interesting and quick way what the business was all about and why. Electrical West would like to hear from you whether such a booklet is needed so that it may be published after the war. A limited number of these Business Guides for the year 1942 are also available upon request by letter.

Electronics—Secret Weapon of War

Presager of a New Scientific and Industrial Era

THE END of World War I left scientists with a new plaything. They did not know it at the time but they had their hands on a revolution. Within two years the world had radio broadcasting. Within ten years the whole art of motion pictures had been transformed as talking pictures replaced silent movies. Within twenty years television was born and people were seeing pictures in motion by radio.

The fulcrum of this revolution is the electron tube, a new tool of illimitable possibilities. One form of the electron tube is the familiar radio tube; the much publicized electric eye is another. There are many other forms, each having distinct capacities for saving time, saving energy, saving money, protecting life, limb and property.

The electron tube puts the electron to work—and the electron is the basic building-block of the universe.

Electronics is the new art, the new science of putting the electron to work. Radio and sound pictures and television are aspects of electronics; but there are many other facets of this revolution which have been brewing since the last war.

The electron tube has a typical American family tree. Edison made the basic discovery of the "Edison effect" some sixty years ago. This was followed by the invention of the "Fleming valve" and the "de Forest grid". Then Armstrong contributed his share, and hundreds of engineers in garret and cellar workshops and in the great university and industrial laboratories went to work on the tubes which employ electrons. The tube was a plaything before the last war but the world conflict brought it out of the toy stage and made it a practical, powerful tool.

Today the electron tube is guiding the destinies of the greatest armies and fleets ever engaged in the history of the world.

It is a part of the nerve center of the battleship, directing its course, finding its adversaries, broadcasting running accounts of air battles to its crews, directing gun fire and determining ocean depth.

In the air it is the means of locating and identifying enemy planes, piloting planes automatically, giving communication from plane to plane and to shore. It is even operating the controls of the plane.

In the maneuvering tank, in the officer's car, on the back of a foot soldier it transmits and receives vocal messages from every unit of the fighting forces.

Along our borders, and those of our Allies is an electronic screen which counts, follows and identifies enemy planes a hundred miles awav through darkness and through fog.

In industrial plants there are electronic counters that enumerate passing articles faster than the eye can see; automatic sorters which discard defective, oversize, undersize, off-color articles; automatic cutters; devices which inspect the inside of things which the eye cannot see; controls which protect workers; controls of temperature; smoke eliminators; intruder alarms; automatic controls for whole batteries of machines.

In its October progress report on American industry, the War Production Board points out that the radio business is *five* times greater than a year ago. From 20 million dollars a month last fall, it has increased to well over 100 million dollars a month. Unfilled war orders are in excess of 4 billion dollars.

From such vast growth will emerge a new engineering of products which will immeasurably improve our peace-time living.

After the war broadcasting will be infinitely more satisfactory: radio receivers will perform with a new fidelity which will amaze us. Television reception will be as flawless as the motion picture. Present secret war developments will readily be convertible to peace-time devices that will improve our standard of living.

No longer will ships collide with other ships, with icebergs or the shore. No longer will trains collide and aircraft crash in flight.

Garage doors will open as we approach and automatically close themselves. Electric lights will automatically go on and off according to our wants and needs. Furnaces and boilers will be controlled and smokestacks will cease to belch wasteful smoke. Air will be made dust free and germ free. Food contamination will be checked, meat made tender.

Grade crossings will be made safe and auto traffic will be automatically controlled.

Medical science sees new wonders ahead. Already it is possible to see "whiskers" on germs, germs which heretofore had been but a blur when viewed through the strongest optical equipment available.

Today so much secret development is going on in the ultra-high-frequency field that little can be said of its great future. But, without divulging military secrets, it can be said that ply-wood is being dried electronically in minutes instead of hours. Ultra-high-frequency welding (not to be confused with flame welding controlled electronically) is being done dramatically and efficiently.

Ultra-high-frequency heating promises to revolutionize the baking industry—it may even heat our homes.

What is this miracle working tube that can see, hear, taste, feel and smell a thousand times more sensitively than was possible heretofore?

What is the electron? No one knows, not even the scientists who know how to employ it. Electrons cannot be seen or felt; but if 6¼ million million million electrons are pushed through a 100-watt electric lamp per second, it will light up to full brilliance. For electric current merely is a mass movement of electrons. Each electron carries its share of electricity, and since the electron has so little weight it can be moved easily and quickly. Therefore, electricity transported by electrons can be turned on or off with great ease and speed. The electron tube merely is a device that controls the flow of electricity. It is an amplifier of power which can be made to do wondrous things. The sound of a termite gnawing inside of a log can be amplified a million times . . . to a roar that can be heard over great distances.

Colors can be classified and matched to a degree not possible by any other means.

Chemical or vitamin consistency can be recognized by counting radio activity within the subject being analyzed.

There is no industry in which electronic circuits cannot be used to speed up production, to increase accuracy, to do heretofore impossible tasks of calibration and measuring.

The opportunities afforded the engineers who are developing this new "electronic age" are limitless.

* * * *

Today the electronic industry is 100% at war. It is meeting the exacting demands made upon it.

Never before was electronic equipment called upon to withstand temperatures ranging from 75 degrees below to 150 degrees above zero Fahrenheit. Never before did radios and transmitters have to withstand the shaking and abuse to which they are being subjected today.

War demands have called for much redesign, much change of materials and a new conception of operating to tolerances never dreamed of in peace-time material. As a result, electronic parts and equipment makers are building better devices.

Universities and colleges are working at top speed to produce electronic engineers, for every radio operator in a plane, every radio man in the ground forces and on ships, every man operating radar equipment or electronic control devices in ordnance . . . and there are many thousands of them . . . must be a trained technician.

The wall of military censorship is high but it is no secret that one of Britain's best weapons that keeps the Luftwaffe from exterminating London is a radio locator, a device that gives alarm of approaching planes long before they can be seen with telescopes. Scanning the horizon constantly the locator warns of the enemy's approach. In the nose of a night fighter, the locator informs pilot and gunner when the enemy is within range. Neither is it a military secret that gunfire can be controlled by electronics, and that electronics is having a big share in training our new armies.

Necessity draws a veil over the most dramatic uses of electronics in warfare, but among those who know there is nothing secret about the fact that many of today's wartime applications will revolutionize our peace-time lives. Electronics will invade every industry with totally new devices and machines. The future of the electronics industry is limited only by man's imagination.

Such is electronics, and its destiny!

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

This is the sixth of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers, and in daily newspapers in New York, Chicago and Washington, D. C. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

Farm Production in Wartime

How to produce more with less manpower and equipment is number one problem for American farmers

H. B. Walker†
Professor of Agricultural Engineering
University of California

WARTIME farm production is subject to constant adjustments. The principal problem of American farmers in this, our first year of active warfare, has been to produce more with less labor and equipment. Considering the restrictions placed on farmers during the year, agricultural production has been meritorious, even if some of the specific goals are not attained. When account is taken of the production regulations set up by government agencies in the past to control farm output on a downward scale and then couple with this our government's promise within the past two years to feed a large portion of the world's inhabitants, no easy task confronted farm folk in 1942.

Faced with the realities of combat warfare our Nation, to date, has concerned itself primarily with organizing and equipping our armed forces for land, sea and air duty and with the necessary transportation services to fight on distant fronts. In this changeover, agriculture, temporarily forgotten, has been assumed by many to be primarily a fountain head of food production which can be turned on or off at will. In fact government, in its efforts to advance the interests of farmers, has left the general public impression that because our farmers were such prolific producers, it has been necessary to pass laws and set up public regulating agencies to keep them from producing too much.

It has been easy thinking in a period of national distress to assume that, if given a chance, our farmers could easily fill the bread basket of our allies as well as our own. Little apparent thought, on the other hand, has been devoted to the agricultural industry as a consumer of goods and services. The National program, during the past year, has been to take away from farmers much of their labor, materials, equipment, supplies and transportation. The impact of these restrictions is just now being recognized by the public, which feels the results in the form of food and other rationing regulations.

While we still have an apparent abundance of wheat, plenty of tobacco, and a reasonable supply of common grades of cotton, we are actually facing shortages of milk, sugar, beef, dried fruits, canned tomatoes, and vegetable oils. So urgent are demands for certain of our farm products that special inducements in the form of subsidies may be required to obtain suitable 1943 supplies.

Labor and equipment problems this season have been serious. With the expansion of our military establishment in 1943 to a total of 7,500,000 men, the outlook for agricultural relief next year is not encouraging. The most encouraging recent development has been the rather loud expression of concern by public officials of the gravity of our food production outlook.

There is much that can be done to meet the situation successfully, if a realistic viewpoint is taken. The problem of agriculture is the production of crops from the land through effective use of labor and equipment. We pride ourselves as Californians in growing upwards of two hundred farm crops in marketable car lot quantities. Not all of these crops are of equal importance in essential values for food, fiber, or as raw materials for industrial purposes.

During the war emergency the economic production of crops when measured in terms of food energy, manhours and equipment is worthy of attention. For example, since the last war, some fifty different vegetable crops have become increasingly important in our national diet. This might be a good time to inquire if all of these are equally important as foods in a wartime diet. Recently, MacGillivray, Hanna and Minges, of the California Experiment Station, made a study of the *Vitamin, Protein, Calcium, Iron and Calorie Yield of Vegetables per Acre and per Acre Man-Hour.* These studies showed a wide range of values when so classified. In rating the best vegetables for efficiency of production of food constituents per acre and per acre manhour, six rate high under both classifications. These are spinach, winter squash, potatoes, carrots, cabbage and cauliflower. On the other hand, onions are high in nutritive value per acre, while canning tomatoes rate high in yields per acre man-hour. Low-efficiency vegetable crops include asparagus, cantaloupe, radishes, cucumbers, and watermelons. It is not to be concluded that low-efficiency vegetables should not be grown, but restrictions on agriculture due to war conditions may make some selection necessary.

The same applies to field crops but selections for such crops would, of necessity, be made on a different basis, since these are grown for food, fiber and industrial uses. Direct field crops having high caloric value per acre are sugar beets, beans, rice, wheat, prunes and peanuts. Indirect farm products having high caloric value per pound are lard, salt pork, butter, cheese and other animal products. When it comes to caloric value per unit of cost, sugar, lard, navy beans, salt pork and rice rank in order given. When compared this way with vegetables, using spinach for example, at April 1942 retail prices one could obtain more than sixteen times* as much energy in calories from a cent's worth of sugar as from the same investment in spinach.

Farmers may expect to be called upon to adjust their production to the needs of the war program. This includes farm products not only for the feeding of our own population, but our allies, and in some cases, hungry neutrals. Moreover, industrial demands for farm products for fiber and oil may be abnormal. Advance information on war crops for 1943 indicates the need for oil bearing crops, such as flaxseed, castor beans, peanuts, and soy beans. High energy food crops will include sugar beets, dry beans, dry peas and soy beans. Fiber crops favored will be SXP (Egyptian, long staple) cotton and hemp. Cover crop seeds will be in demand. With the exception of wheat, some types of cotton, and possibly tobacco, there will be no important crop growing restrictions in the United States in 1943.

The shortage of vegetable oil crops has caused our government to set a flax goal for California of 350,000 acres in 1943 compared with a crop of 207,000 acres for 1942, an increase of approximately 70%. Flax, fortunately, isn't a difficult labor crop but it does involve clean, irrigable land. Certainly this requirement will not simplify irrigation problems in the Imperial and San Joaquin valleys.

The bottleneck of California farming at present is labor. The growth of war industries, building of military camps, selective service, removal of Japanese, and heavy increases in transportation on and to the Pacific Coast all have tended to siphon off from our farms, skilled, semi-skilled and able-bodied labor.

The State Division of Labor Statistics indicated 2,222,000 people were employed in California in non-agricultural activities in May, 1942. By June farm

† From an address before the Pacific Coast Electrical Association at Fresno, October 23.

* Lamborn Sugar Market Report. New Agriculture, page 5, September, 1942.

wages had increased 30 to 40% over the previous year. Such increases, however, could not attract farm labor since the average hourly wage paid to agricultural workers this past June was about half that paid to workers in the durable goods industries, where employment by May, 1942, was 260% of the May, 1940, level. The draft, in raising the first four million, took about one-fourth of the able-bodied men between the ages of 20 and 35 years of age. With the drafting of 18 and 19-year-olds an even heavier drain will fall on our farmers.

Present war programs do not provide a definite labor source for agriculture. Dependence for labor must be placed upon men unfit for military service, women, children, and, to a limited extent, alien workers.

Difficulties in harvesting high labor demand crops like tomatoes, sugar beets and prunes have had a discouraging effect upon our farmers due to threatened financial losses from unreliable labor supplies. These crops, no doubt, will constitute desirable farm products in the war effort for 1943. This has been so serious with crops like sugar beets and tomatoes that in all probability some sort of a harvest guarantee will be necessary to secure satisfactory 1943 acreage sign-ups.

Certain crops have a higher labor demand under the "Food for Freedom" programs than under normal marketing conditions. This is due to the unprecedented demand for dehydrated products. For example, a six-ton apricot crop, sold fresh, requires 235 man-hours per acre, while the same crop sold dried requires 433 man-hours per acre. For many of our crops outside hired labor is essential and this labor represents more man-hours than the total supplied by regular full time operators. It is apparent growers will favor lower labor demand crops in 1943 unless some protection from labor difficulties is arranged previous to the planting season.

In the face of this difficult labor situation there is the additional problem of farm equipment regulations. To equip and supply an armed force of 4,000,000 men, which is in the neighborhood of our present military manpower, requires practically all of the productive output of our Nation. To almost double the size of our present military establishment means that goods of all kinds for civilian use must be reduced to the barest necessities. In the case of equipment and supplies for agriculture this has been keenly felt already and even further restrictions for 1943 are anticipated.

Apparently it is the belief of action agencies in Washington that American farmers have been well equipped, and it is possible for them to coast a few years with what they have and still produce unprecedented volumes of crops. They point to the rapid mechanization of farms and the great numbers of tractors purchased by farmers during the past decade. Also they point to the rapid growth of rural electrification under federal subsidies. No one can deny that rapid changes have taken place and, in much of the country, conditions are such that coasting is easier than in California, where mechanization in agriculture is no recent innovation. Here our farms are more nearly on a strictly maintenance basis than in other areas.

Reference to recent census data is enlightening in this regard. Take as an example five of the leading agricultural states, each having about the same dollar value production in normal prewar years. These states are California, Illinois, Iowa, New York and Texas. During the past ten years the percentage of increase in farm tractors in these states has been, California 24%. Illinois 81%, Iowa 94%, New York 46% and Texas 165%. It does not follow that we are less mechanized because that is not the case. But because we have had mechanization longer we have not made so many power changeovers during the past ten years and our equipment is older.

To further illustrate this important point let us consider the average year tractor model for these five states: California 1931, New York 1931, Illinois 1934, Iowa 1934, Texas 1935. Likewise, the equipment used with these tractors is older and is used more hours per year because of our longer growing season. Our rubber tires may be no older in years than other states but surely they are more worn.

But this isn't our only handicap. California uses more tracklayer tractors in agriculture than any other state. If permitted we would purchase around 60,000 drawbar horsepower per year of this type of mobile power unit, but such tractors are not even rationed to farmers now. Since much of our mobile field equipment is adapted to large tracklayer power plants many of our farmers face the problem of discarding this field equipment when their present power plants become disabled.

In the electrical field a similar condition prevails. The 120,000 electrified farms of California, for the most part, have been served for many years—some for as long as 30 years or more and a majority for more than 15 years. Electricity has become so matter of fact and useful on California farms that the consumption of energy is approximately equal to that of all other electrified farms of the Nation.

Other than on the Pacific Coast federal subsidies for rural electrification have been responsible for rural electrical growth; and most of these are new installations taking place within the last decade, with the average but a few years ago. Thus the electrical equipment on farms away from the Pacific Coast is relatively new and unused, while ours is old, heavily used and our needs are primarily normal replacements. We have a million horsepower of connected electrical load on our irrigation pumping plants. These plants are essential production units for growing flax, long fiber cotton, fruits, vegetables, alfalfa and pastures. Neglect of such an essential service in wartime constitutes near sabotage of our required food, fiber and industrial supplies.

Transportation may become a bottleneck in farm production in California. We do not have a close network of railroads to move our products from farm to market. For the most part, our rail lines are trunk lines, making up a part of the arterial rail system of the Nation. These lines serve us splendidly in normal times, but war has flooded them with unusual burdens which cannot be avoided. While we have a magnificent network of highways these may lose much of their present significance by our loss of rubber. Practically all of the marketable products of California farms are now carried some distance on rubber on their way from field to market. These products represent millions of tons, many of which, like soft fruits and vegetables, must be moved quickly and promptly to avoid loss. No doubt during the war period more and more of our farm products will be dried on the farm to reduce tonnage. Farm storage of grains will be encouraged to better distribute haulage; home processing of feeds will be necessary for livestock and poultry production and gardening for home consumption will be required if we have some of the ordinary things which we heretofore obtained by frequent visits to the local grocery. Farm transportation is a major agricultural problem generally underestimated in importance by the public but daily becoming more acute.

What can we do about these problems?

1. Farmers must be prepared to make fairly quick and radical changes in their production programs. Business as usual on the farm is just as obsolete as in the factory.

2. In seeking special farm products of high military importance, such as sugar, vegetable oils and dehydrated products, some special subsidies covering production and harvesting risks should be considered. Without this farmers cannot be expected willingly to assume the risks involved. For example, a potential saving of 8,000,000 man-hours in the production of the desired 1943 California sugar beet crop is possible. It may be practicable to equip to save one-half of this. However, no farmer, or group of farmers, can do this alone. With the present

rigid governmental restrictions on materials and equipment these potential savings in manpower become next to impossible. But if government wants more sugar with less manpower some recognition of efforts along this line is essential.

3. Labor in 1943, for production in field and factory, must be considered as plain hard work that has to be done by whomever is available. We have come a long way in this attitude this year. A lot of people are finding out they can do production work if they try. Women represent our best untapped source of labor for agriculture; children and the aged perhaps are next, and alien labor third. In thinking of women and children doing farm labor we must not permit ourselves to look at this as a plain substitution. All of our farm equipment and many of our methods have been developed on the basis of able-bodied male workers. Women are willing and careful workers but adjustments in methods and equipment are essential to obtain results.

4. All production must be based on a labor-hour output rather than dollar cost and the government must be prepared to encourage this approach. Other than for safety and health, social gains must be forgotten for the duration.

5. The idea of land armies has merit, particularly for meeting peak labor problems. Drafting of labor with assignment to tasks may be necessary to protect our food supplies.

6. Cross haul of farm products from field to processing plants must be overcome and enforced. This can and should be overcome by voluntary agreements among processors. Some are doing this now.

7. The government must recognize more fully that agriculture is a consumer of goods and services as well as a producer of raw products. To assume the latter and forget the former means the eventual collapse of our farm production plants.

We can and will meet these problems by working together. The electrical industry occupies a key position. Agriculture has greater need of its services than ever before. More and more processing and storage of crops must take place on the farm. Farm women need more than ever, the kitchen and laundry aids electric services provide. How to maintain this service in the face of restrictions made necessary by war is largely the problem of the electric industry, particularly in the matter of leadership.

Air Conditioning Insures Nut Quality

Electrically air conditioned storeroom is good investment for California Walnut Growers Assn.

QUALITY insurance for Diamond, Emerald and other brands of walnuts marketed by the California Walnut Growers Assn. is provided in a large electrically air conditioned storage room at the association's modern plant in Vernon. Nuts awaiting shipment are kept at a temperature between 33½ and 35° F. Humidity is maintained between 60% and 62%. The air is filtered for cleanliness, and its freshness is assured by the circulation of 225,000 cu. ft. of air per minute.

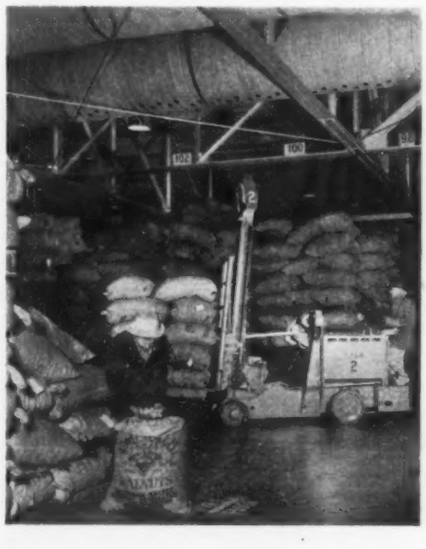
Original freshness and quality of the walnuts, with consequent high sales value, is retained during storage under these conditions, which were determined as ideal by the association after years of research. Kernels remain light in color, full bodied and full flavored

Also with air conditioned storage, there is no likelihood of insect infestation or of rancid nut oil.

The insulated storage room covers almost three acres and accommodates 190,000 100-lb. bags of nuts. Along the length of its 600-ft. ceiling are four ducts distributing the conditioned air evenly to all parts of the storage area.

Shelled walnuts, rapidly gaining in popularity, are held in another storage room covering about two acres. Air conditioned electrically in the same way as the larger room, it is capable of storing close to one million 25-lb. cases of nut meats.

The California Walnut Growers Assn., a federation of non-profit agricultural cooperatives, has a membership of more than 8,600 growers producing approximately 85% of the state's walnut crop.



A section of the California Walnut Growers modern plant at Vernon. Electric air conditioning insures quality nuts

The air conditioning system, engineered by Paul A. Scherer of Airesearch Mfg. Co., Los Angeles, has a total capacity of about 240 tons of refrigeration, consisting of three two-cylinder vertical ammonia compressors. Each of these is driven by a 100-hp. electric motor. The fans and pumps give an additional connected load of about 75 hp. The ammonia system is conventional in character except that the cooling tower is exceptionally large in order to maintain low head pressures, and the brine coolers are of large capacity to give reasonably high back pressures.

The cold brine is circulated over vertical glass plates spaced about ½ in. apart. These sheets are about 40 in. high and 48 in. wide. The brine flows vertically over these sheets with the air flowing horizontally between the sheets. In this way direct contact is secured between the air and brine, resulting in high efficiency of heat transfer, close control of relative humidity, and a scrubbing or cleaning action between the brine and the air.

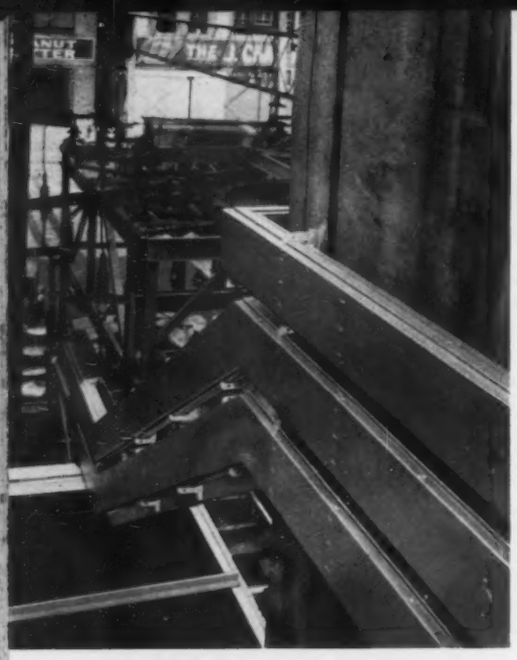
About 225,000 cu. ft. of air per minute is circulated through the two storage rooms. The pressures have been so balanced that it is possible to operate high lift electric trucks in and out of doorways with their full loads with little effect on temperatures. The distribution of the cold air is handled so that the close control of temperatures is possible. In normal operations the variation does not exceed 1½°. The relative humidity is controlled within 2%. This is important in view of the fact that the weight of the nuts varies with the relative humidity.

● DEMANDS FOR increased egg and milk production imposed on farmers by the Department of Agriculture as part of the war program will necessitate maximum efficiency in farm operation. Rural power specialists can call two electrical applications to the farmer's attention that will help him. One is the poultry trough heater which will increase the average egg production per hen by 12 eggs per year if drinking water is maintained at 50 to 55° F. during the winter months. The second is the dairy water trough warmer which will insure increased milk production and lower the quantity of feed required per cow.

Busway Plant Distribution—1

War production efficiency plus peacetime plant conversion inherent in modern enclosure design

*Lester Siebert**
Manager
Trumbull Electric Mfg. Co., San Francisco



Exposed busway substation feeders

ENCLOSED busbar distribution systems have come into common usage in the West as well as elsewhere to meet the needs of war industry for the greater availability of electrical power in production areas. Beginning in 1927 the automotive industry pioneered the application of enclosed busbar systems, as a solution to the frequently recurring necessity of modifying the electrical distribution system incidental to mass production changes.

The nature of industrial application requiring economy, safety and compactness, brought about commercial designs using formed metal enclosures, porcelain or cold-molded insulating supports and closely spaced copper busbars. The common industrial voltages for which commercial designs are being manufactured are: 120/240 volts, single-phase and 120/208 volts, 3-phase, 4-wire for lighting, and up to 600 volts, 3-phase for power.

Industrial applications of enclosed busbars are for main feeders, generally in current ratings up to 4,000 amp. and for obtaining convenient outlets for power in current ratings from 125 to 1,000 amp. Both types of products are classified as "busways" in the National Electric Code but in this paper the two types will be differentiated by the terms "Feeder busways" and "plug-in busways."

Feeder Busways

The selection of the type of distribution system which can best serve a specific industry or requirement is a matter for the consulting engineer to decide. Some have preferred the "tree" method of distribution, employing a main trunk feeder of large capacity to which branch loads are connected through protective devices scattered throughout the system.

Recently, there has developed a renewed application of the time-honored radial system which makes possible the centralization of feeder protective devices as in a switchboard in a transformer vault or other restricted areas.

Here the new low voltage drop feeder busway teams up with the old, to produce a factory assembled product of predetermined unparalleled performance not obtainable by any other method of installation.

Feeder busway systems are available with standardized sizes of busbars for light and power service not exceeding 600 volts. The multiple bar method employed in low voltage drop designs permits parallel connection of enclosed insulated busbars to obtain high capacity feeders in a single enclosure, or segregated busbar groups to provide several circuits in a single enclosure, as required for radial or load center distribution systems.

High capacity feeder applications generally consist of tie-ins between transformers and switchboard, main feeders for power and light, secondary network feeders, risers in office buildings, main feeders to plug-in busway runs, feeders for electric furnaces and for feeding groups of welding machines.

There are unlimited opportunities to employ busway feeders in the radial or load center distribution systems. Some of the more common applications provide for a number of circuits from a switchboard to light and power load centers, riser circuits from a switchboard to load centers located on the several floors of multi-story buildings, circuits from a switchboard to feed individual runs of plug-in busway. In all cases busways of this type provide inherent flexibility as well as conservation of critical materials and labor.

Current Ratings

The current ratings of these standardized conductors depend upon the type of enclosure and the number of busbars in a single enclosure. By the parallel connection of busbars, feeders of unlimited capacity may be obtained.

In consideration of conductor economy, carrying capacity and installation convenience, it has been determined that the number of insulated busbars in a single sealed enclosure should generally be limited to 16. All listings are based upon this recommendation although designs are available with a greater number of busbars.

The present standard of the National Electrical Code calls for enclosed busbar current ratings based on 1,000 amp. per sq. in. of copper busbar cross section.

It is generally recognized that a loading of enclosed busbars to a current density of 1,000 amp. per sq. in. in some installations may result in busbar temperature rise in excess of values which are considered good practice. In the past, manufacturers and users have made allowances in current ratings, through knowledge of designs and applications of enclosed busbar systems to assure satisfactory installations under this current density standard.

Although the Underwriters' Laboratories, Inc., still recognizes enclosed busbar systems based on 1,000 amp. per sq. in. it has recently adopted a standard for rating enclosed busbars on the basis of a hot spot temperature rise of 50° C above an ambient of 24° C. Although the materials used will not deteriorate, under sustained temperatures considerably in excess of this new standard, our company, in order to conform with this recommendation and to promote safe practice, has determined by tests temperature-rise current ratings of its standardized busway designs.

When conductors are enclosed in such a manner as to confine the heat which results from transmission power losses, the current rating of the conductors must be reduced, depending upon the size of the housing, the number and cross section of conductors and the shape of conductors.

It is apparent that if the conductors were exposed to the cooling effect of free air an appreciable economic gain in conductor material would result. In recognition of this important advantage especially designed vented enclosures were developed to produce what we term "airated" low voltage drop busways.

Referring to current ratings in table 1, it will be noted that "airated" insulated busbars will carry considerably more current than the same conductors in a sealed enclosure. Since the current rating of the ventilated busbars is effected only slightly by an increase in

* Presented at the annual meeting of the Southwestern Section, International Assn. of Electrical Inspectors, Fresno, Sept. 22, 1942.

Table 1

Carrying capacity of LVD busbars 50 deg. C —25 deg. C ambient
122 deg. F 76 deg. F ambient

Type enclosure	Type busbars Size	No.	CM	Total number of busbars in one enclosure 2–4	5–9	10–16
Completely enclosed	3/16 × 1"	C3	221,896	300	270	225
	3/16 × 1½"	C4	349,241	400	360	300
	7/32 × 2"	C5	545,618	500	450	375
Airated	3/16 × 1"	C3	221,896	440	400	360
	3/16 × 1½"	C4	349,241	550	500	450
	7/32 × 2"	C5	545,618	700	670	600

To determine carrying-capacity of parallel connected busbars first figure total number busbars in enclosure, then select carrying-capacity of individual busbars from above table and multiply by number of busbars per phase. For installations having normal load factors it is recommended two parallel enclosures be used if more than 16 busbars are required.

Table 2

‡No. and size of insulated busbars	"K" values single-phase phase-to-phase	"K" values three-phase† phase-to-phase	"K" values d-c* line to line
3-C3	155	146	115
3-C4	91	86	68
3-C5	61	58	46
6-C3	77	68	58
6-C4	45	40	34
6-C5	30	27	23
9-C3	50	41	38
9-C4	31	25	23
9-C5	22	16	15
12-C3	38	30	29
12-C4	22	17.5	17
12-C5	14	11.5	11

* This column is included for comparison purposes.

† These values also apply to 3-phase, 4-wire circuits, assuming balanced loads.

‡ For combinations of segregated circuits employing C3, C4, and C5 conductors in a single enclosure use separate values of "K" for each 3-phase or single-phase circuit and solve for each circuit voltage drop.

the number of bars, the number of conductors that it is practical to furnish in one enclosure, becomes a problem of field installation rather than conductor economy.

Past practice has required the installation of enclosed busbar systems with copper considerably in excess of the system current demands to compensate for the sealed enclosures and to secure good voltage regulation. This wasteful practice can now be eliminated.

The economy of such systems results from lower installation costs, flexibility in meeting recurrent changes in productive equipment location, salvability of materials, long life, lower power losses, high efficiency of equipment operation through voltage regulation and, most important, the elimination of lost production due to costly shut-downs caused by feeder faults.

Voltage Drop

In direct current systems, the voltage drop depends upon:

Resistance of the circuit,
Length of the circuit,
Current carried by the circuit.

In alternating current systems, the voltage drop depends upon:

Impedance of the circuit,
Length of the circuit,
Current carried by the circuit.

The impedance of an alternating-current circuit is made up of two components: a-c reactance and a-c resistance. Ordinarily in busbar structures the relationship of these components is complicated and rather involved calculations are required to get even an approximate solution of a problem.

Fortunately, in the low voltage drop designs because of extremely low reactance and an a-c resistance value about equal to the d-c resistance of the circuit, calculations closely resembling ordinary d-c circuit methods may be made to solve the majority of a-c application problems.

An equation for such a-c calculations follows and the accompanying table 2 gives values of the design constant "K" for various ratings:

$$\text{Total voltage drop} = \frac{K \times \text{circuit amp.} \times \text{one-way distance in ft.}}{1{,}000{,}000}$$

This gives total drop, i.e., phase-to-phase drop of going and return circuit. Values of K for standard busbar capacities at 50° C. rise above 24° ambient area in the table.

Further, in applying the voltage drop figure obtained to voltage regulation calculations, it will be found sufficiently accurate for practically all individual problems to subtract the voltage drop directly from the circuit voltage rather than make a vectorial subtraction, taking into account the power factor of the load. This method results in the worst possible voltage regulation that can occur on the busway system under consideration.

Thus the procedure is reduced to that of a single direct-current circuit calculation as given by the following example:

Given: A parallel-connected 9-C5 3-phase busway system 300-ft. long carrying a 1,000-amp., 440-volt, 3-phase, 60-cycle, power load.

Required: To find the voltage regulation at the load of 1,000 amp.

$$\text{Formula for voltage drop} = \frac{K \times 1000 \times 300}{1{,}000{,}000}$$

from the table, "K" for 3-phase circuit using 9-C5 busbars is 16.

$$\text{Therefore, voltage drop} = \frac{K \times 1000 \times 300}{1{,}000{,}000}$$

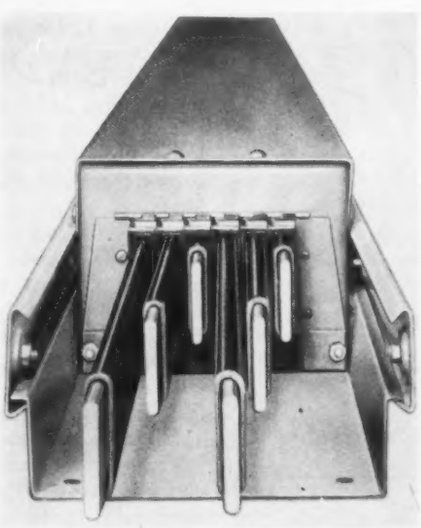
$= 4.8$ volts.

$$\text{Voltage regulation} = \frac{4.8}{440} \text{ or } 1.1\%.$$

Comparative calculations and tests have proved that results obtained by this method are accurate for busway application problems and in fact are often more accurate than the available information on connected loads, demand factor, distance to load centers, or power factor.

[Various applications of busway will be told in next month's article herein.]

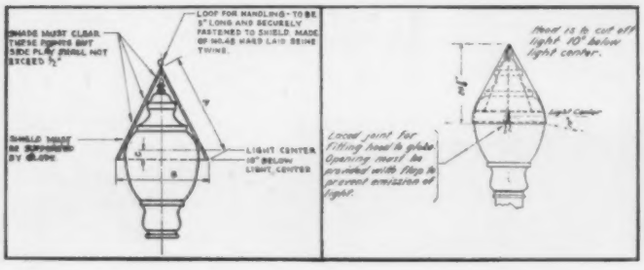
Close spacing of insulated busbars makes the low voltage drop possible. Below is the "airated" or ventilated busway with higher carrying capacity



Dimout in Detail-Proclamation 12

TYPE OF LUMINAIRE	DIMOUT METHOD TO BE USED IN INTERIOR AREAS.	DIMOUT METHOD TO BE USED WHEN LIGHT IS VISIBLE FROM THE SEA.
① Metal Canopy	No Change Required	Paint or Dip 200° of globes surface or remove Luminaire
②		
③	Depends on shielding angle of hood and ~~Remove Refractor~~ position of light center	Remove Refractor and install shield.
④ Radial Wave	No Change Required	Install Shield.
⑤ Sodium Vapor		Also shield sides
⑥ Light Center	Shield, dip or paint 10° below light center	
⑦		
⑧		
⑨		
⑩		

Paint shielding above, cement cone and fabric hood below


SHADE MUST CLEAR THESE POINTS BUT SIDE PLAY SHALL NOT EXCEED ½"
LOOP FOR HANDLING - TO BE 5" LONG AND SECURELY FASTENED TO SHIELD. MADE OF NO.40 HARD LAID SEINE TWINE.
SHIELD MUST BE SUPPORTED BY GLOBE
LIGHT CENTER 10" BELOW LIGHT CENTER
Hood is to cut off light 10° below light center.
Light Center
Locod joint for fitting hood to globe. Opening must be provided with flap to prevent emission of light.

Street lighting control methods approved

Western Defense Command meant it when it set Nov. 12 as deadline for street lighting conformity with Proclamation 12. In southern California some 30,000 street lights which had not yet been hooded or painted to prevent skyglow were ordered off until so fixed. Seattle had delayed its preparations and 14,000 street lights were put out. Most other regions covered by the dimout order had complied, costly though it was. Without access to any critical materials, ingenuity was drawn upon to the extreme. Pictured at the right are some of the methods used. At the left are Pacific Gas and Electric Co.'s standards for dimout conformity, and endorsed by OCD as correct. Seattle had tried to shield by inserting a cardboard disc in the luminaire, but this did not give the required below-horizontal cutoff. At top, right, W. J. Tretheway, city electrician, Huntington Park, dipped a paper carton in roofing tar to weatherproof it, placed it inverted over the remaining globe of the double-globe ornamental fixture. (Depression economy had caused the other to be capped.) This idea was used extensively in southern California. In PG and E territory painting was used according to the drawing at left. Painted luminaire is shown below that with the box. Most ingenious were the bottom two pictured devices; a treated fabric cap to fit over a luminaire, and the cement and cheesecloth cone shield that resembles the old-fashioned candle snuffer. Details of both are in the drawings at lower left. The Romicone cement shield is quickest installed, easiest removed; working from an extension truck they can be placed on the units almost without stopping. Manufacture was a real triumph of ingenuity over restrictions on materials. Street lighting shielding methods are checked by OCD for compliance. Traffic signal control is proving difficult because of the variety of systems and location of signals

Home and Office

Light control to prevent skyglow told in pictures

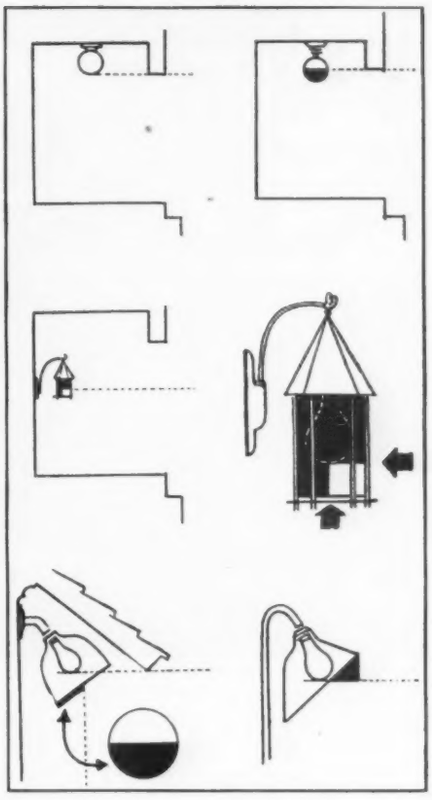
Arrests are now being made in cities throughout the zone of restricted lighting for stationary violations of Proclamation 12 by householders, offices, stores and apartments. Officially interpreting the meaning of the proclamation for easy understanding the drawings below were used in a booklet by the San Francisco Civilian Defense Council. The porch light drawings at the right are from Southern California Edison Co.

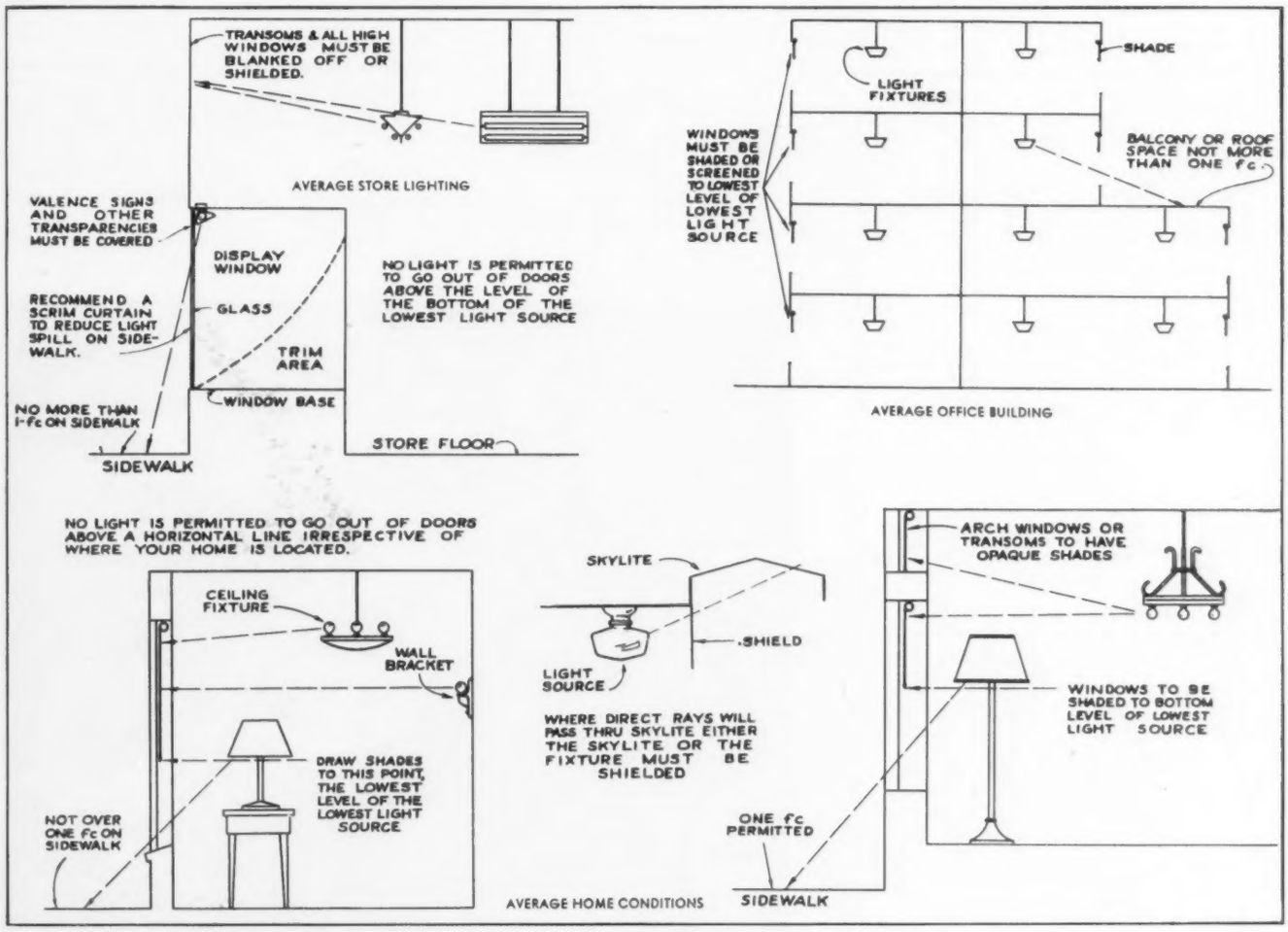
All of these requirements are for *all* places within the restricted zone, not alone those visible from the sea. The purpose is to reduce skyglow by preventing emission of light in an upward direction by *any* source of light. The entire fixture is considered to be part of the light source. Ordinary lamp shades are *not* considered as suitable shields. Glass diffusing bowls are not considered a shade but rather a part of the light source.

Outside lights, (not signs) such as porch lights, entrance lights and stair lights are permitted if so shielded that no light goes outward above the lowest point of the lamp. Light reflected against the wall from these sources must not floodlight the wall, hence only lamps of low wattage should be used in such places.

If interior light sources are so located as to shine directly upward through a skylight opening they or the skylight must be properly shielded. Light striking roofs from skylights or windows is limited to 1 foot-candle measured on the surface of the roof, the same as required for ground areas. Clear glass skylights must be shielded at night if light on the floor below them exceeds 1 foot-candle. Windows facing lightwells must also have shades drawn as low as the bottom of the lowest light source. Windows located close to the ground, whether home, apartment or store show window, must not permit light on the ground or walks outside in excess of one foot-candle.

Exterior lighting, such as for out-of-door yard lighting, badminton court, etc. must not exceed 1 foot-candle measured on the ground area and since the entire reflector is considered part of the light source, it must be tipped downward so that no light source or reflector surface shows above the horizontal. Shielding pictured at lower right will not pass.




TRANSOMS & ALL HIGH WINDOWS MUST BE BLANKED OFF OR SHIELDED.
AVERAGE STORE LIGHTING
VALENCE SIGNS AND OTHER TRANSPARENCIES MUST BE COVERED
DISPLAY WINDOW
GLASS
TRIM AREA
WINDOW BASE
RECOMMEND A SCRIM CURTAIN TO REDUCE LIGHT SPILL ON SIDEWALK.
NO LIGHT IS PERMITTED TO GO OUT OF DOORS ABOVE THE LEVEL OF THE BOTTOM OF THE LOWEST LIGHT SOURCE
NO MORE THAN 1 Fc ON SIDEWALK
STORE FLOOR
SIDEWALK
SHADE
LIGHT FIXTURES
WINDOWS MUST BE SHADED OR SCREENED TO LOWEST LEVEL OF LOWEST LIGHT SOURCE
BALCONY OR ROOF SPACE NOT MORE THAN ONE Fc.
AVERAGE OFFICE BUILDING
NO LIGHT IS PERMITTED TO GO OUT OF DOORS ABOVE A HORIZONTAL LINE IRRESPECTIVE OF WHERE YOUR HOME IS LOCATED.
CEILING FIXTURE
WALL BRACKET
DRAW SHADES TO THIS POINT, THE LOWEST LEVEL OF THE LOWEST LIGHT SOURCE
NOT OVER ONE Fc ON SIDEWALK
SKYLITE
SHIELD
LIGHT SOURCE
WHERE DIRECT RAYS WILL PASS THRU SKYLITE EITHER THE SKYLITE OR THE FIXTURE MUST BE SHIELDED
ARCH WINDOWS OR TRANSOMS TO HAVE OPAQUE SHADES
WINDOWS TO BE SHADED TO BOTTOM LEVEL OF LOWEST LIGHT SOURCE
ONE Fc PERMITTED
SIDEWALK
AVERAGE HOME CONDITIONS

LIGHT for a GROCERY

The Need

Adequate general illumination over bins and shelving to display merchandise to advantage for a self-service type of market where attractiveness of merchandise must be relied upon for sales appeal.

Installed

In this store, 63 4-lamp fluorescent units, containing 40-watt F lamps, mounted flush against the ceiling. Ceiling height about 14 ft. Large sign on exterior and three 1,500-watt floodlights over the parking lot also installed.

Who

Success Market, 916 South Main St., Salt Lake City, Utah. Design of lighting by Ray L. Davis, Utah Power & Light Co. commercial service bureau. Installation by Wasatch Electric Co.

Results

Initial intensity from 35 to 40 foot-candles inside the market.

The Need

Maximum sparkle on a variety of merchandise displayed on counters, and general illumination for the area.

Installed

Over the counters a row of down lights, mounted flush in the ceiling, covered by diffusing glass, lamped with incandescent lamps. For general lighting, suspended 4-lamp, 40-watt F, lighting units with diffusing glass sides.

Results

Average intensity over counters of 65 fc.

LIGHT for a VARIETY STORE

Who

J. J. Newberry Store, at Yakima, Wash. Lighting design assisted by commercial lighting staff of Pacific Power & Light Co.

EMEA *Dope Sheet* — *Edited by Howard C. Park*
EMEA of So. Calif.

Apparatus Maintenance Check Chart

What to do to reduce repair time on electric equipment for industrial and power house use

To reduce repair time of electrical apparatus for industrial and central station use, a maintenance check chart has been released by the Westinghouse Electric and Manufacturing Co., which is applicable to all makes of equipment. Scope of the chart covers motors, controls, arresters, wiring fuses, and transformers as listed below:

Motors

1. *Keep windings, ventilating ducts, commutators and brush rigging clean.* In dusty locations, blow out weekly; under severe conditions, daily. Do not use air pressure higher than 50 lb.
2. *Lubricate regularly, carefully.* Follow manufacturer's instructions. Oil daily those motors that require it. Schedule definite oiling dates for others. In dusty or damp locations, drain oil once a month and renew. Do not over-lubricate. It wastes oil, gets in windings and deteriorates insulation.
3. *Examine bearings.* Check daily on heavily used motors; once a week on others. Check oil ring. Feel for high temperatures. Check for excessive end play.
4. *Check air gap between the rotor and the stator.* Check weekly on motors that operate with excessive belt tension; others, once a month. Differences in width of gap indicate bearing wear which, once started, accelerates rapidly.
5. *Inspect brushes and commutators.* Check daily on those motors in severe service; others once a week. Keep commutators smooth, with brushes seated perfectly. On carbon brushes use correct grade to prevent excessive commutator wear and control arcing.
6. *Inspect all exposed motor leads.* Check weekly, keep connections tight, free from oil and moistures, well insulated and protected.
7. *Inspect ground connections.* Check weekly, keep tight in a good condition. These are important to safety of employees and in some cases, of current protective devices.

Wiring

1. *Keep wiring in safe condition.* Examine monthly where vibration exists. Keep lock nuts and bushings tight on conduit, cables and other raceways. Protect wire from oil and water. Keep open wiring tight, insulated and safe from mechanical injury. Inspect all wiring once a year.
2. *Check extensions and drop cords.* Examine every three months where use is heavy. Check closely where wire enters socket, plug, switch, etc. Replace or repair wear promptly. Keep drop cords away from nails, metal hooks, etc. Keep lamp guards in place.
3. *Keep switch, junction, fuse and panel boxes clean and tightly covered.* In dusty locations clean out weekly. Keep covers and unused "knockout" plugs in place. Inspect monthly.

Control Equipment

Includes magnetic switches, air and oil circuit breakers, controllers, compensators, etc.

1. *Keep control equipment clean.* Once a week clean and blow out dirt and dust from starting switches, compensators and air circuit breakers. Under unusually clean conditions, clean out quarterly or semi-annually. Keep dirt and dust off high voltage bushings and terminals.
2. *Keep contacts smooth.* Inspect heavily used equipment weekly, others once a month. File burned contacts smooth or replace. Do not lubricate contact surfaces.
3. *Replace worn parts.* Under severe conditions examine all equipment monthly and replace all worn or burned parts; under normal conditions, semi-annually. Keep adjustments correct.
4. *Keep electrical and mechanical connections tight.* Once a week inspect parts that vibrate. Look for loose connections, missing or loose nuts, and broken mechanical parts.
5. *Keep oil at proper level and in good condition.* Under severe conditions or in dirty or damp locations, make a monthly check of oil condition and oil level. Replace dirty or gummy oil. Keep level up to indicator.
6. *Check overload devices.* Circuit breaker tripping points should be checked monthly. Replace dashpot oil if thick and gummy. Keep orifices in plunger clear. Keep leather bellows soft and pliable with neat's-foot oil. Be sure that heater coils for thermal overload relays are the correct size. Check overload relay settings every six months.

Lightning Arresters

1. *Maintain ground connections.* Inspect in early spring before the start of the lightning season. Check the condition and resistance of ground connections. Resistance should not be over 5 ohms. A buried water main provides good ground. Never run ground wire through iron or steel pipe unless wire and pipe are bound together.

Fuses

1. *Check size.* Twice a year inspect all fuses to determine that circuits are not overfused.
2. *Keep fuse clips clean and tight.* Check connections to prevent overheating and breakdown.
3. *Maintain refillable type fuses.* Replace charred casings. Keep fuse assembly tight. Refill with links at the same rating as the casing.
4. *Keep fuse and switch cabinets tight.* Prevent escaping sparks when fuses blow by plugging unused knockouts. Always keep doors tightly closed and secured.

Transformers

1. *Keep oil in good condition.* Test annually to determine dielectric strength. If less than 18 kv. in standard tester, recondition oil.
2. *Maintain oil and proper level.* Check oil level every three months. Replace leakage and evaporation loss promptly.
3. *Prevent excessive temperatures.* Test operating temperatures of fully loaded transformer once a month. Temperature should never exceed 90°C.

● INSPECTORS LIST as causes for electrical fires—loose contacts that cause heating, such as poor splices, unsoldered joints, nuts not screwed tight at terminals, lugs poorly soldered, poor contacts at fuse clips, enclosed switches not kept closed, defective lamp holders, snap switches, lugs that do not fit tight against terminal bus bars.

ELECTRICAL WEST

McGRAW-HILL COMPANY OF CALIFORNIA
68 POST ST. SAN FRANCISCO

The all-industry magazine of progress, established 1887 and incorporating the "Electrical Journal," "Journal of Electricity, Power & Gas" and "Journal of Electricity." Contents Copyrighted

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Election Aftermath

SOME of the political harshness that has been directed toward the power companies may stop now that the November elections have indicated a change in public temper. A lot of public power advocates had fallen by the wayside when the votes were in and counted. Foremost, of course, was octogenarian Senator George W. Norris. However, there were others and many of them were in the Pacific Northwest, where public power has been in the spotlight for several years.

Although their advocacy of public power may not have been the sole issue, nevertheless it is significant that in Washington Representatives Knute Hill and Martin Smith, co-sponsors of the Columbia Valley Authority bills, were both defeated for re-election. So also was Representative Walter Pierce in eastern Oregon. C. C. Dill in Washington, and Edward C. Kelly in southern Oregon, both confirmed campaigners for public power, were defeated for seats in the House of Representatives.

Salem's *Oregon Statesman*, editorializing on the election said: "We look for a period of greater sanity in public approach to this issue. But it's possible that we may have understated the case. Public power, the way these political leaders want to play it, would have meant a huge stifling bureaucracy here in the Northwest. And beyond doubt Tuesday's protest vote was largely inspired by a distaste for bureaucracy, of which the public has lately been getting too generous a diet."

However, the significance goes even deeper than that. At least for the duration the public is far more interested in other issues, not the least of which is winning the war.

Freedom of Light

SANTA CLAUS will have some difficulty finding his way about this Christmas. There will be no outdoor Christmas lighting on trees and shrubs and houses, such as pictured on our front cover, to greet and cheer the passerby or to direct Santa to the chimney. War has blacked out all outdoor lighting this anniversary of our entry into the fighting war. Inside our homes and hearts Christmas will still be bright.

Bright too will be the memory of the carefree, brightly-lighted Christmas of the past, and keen our determination to free the world from the fear that has caused even Christmas to be hidden from the weapons of war. Freedom of Christmas, which we sometimes call freedom of religion, is one of the main causes for which we and our allies are now fighting on every front throughout the earth.

May our *next* Christmas see a return of light to the world, an end to dimout, blackout, and dark fear. Let us add a freedom to the list—the Freedom of Light.

Integrated Operations

"HELL, you folks out here are doing things that we still are dreaming about!" This cryptic comment from an Eastern power man was made recently after a personal investigation of the coordinated operating programs in effect in the Pacific Northwest and in southern California. Now that figures have been released on the extent to which the Columbia River generating plants have carried the load through the driest summer and fall experienced in the Northwest in many years, it is possible to comment on these integrated operations.

In Oregon, Washington, Utah, Idaho and Montana Electric Bond & Share utility properties have experimented for several years with integrated operations so as to utilize the most efficient and cheapest sources of power. Later the other privately-owned utilities were tied in to the arrangement, followed by the Tacoma and Seattle municipal systems. With war-imposed emergency loads, the WPB suggested that the program be expanded to include the Bonneville Power Administration, with its Bonneville and Grand Coulee plants. This was done. All generating facilities were pooled and loads were met from those power sources best able to serve them. The whole arrangement was ad-

ministered informally by a committee of engineers representing the various agencies involved.

Thus when drouth hit, plans were ready, operating techniques perfected, necessary interconnections functioning. Hence what might have been a serious power shortage, with public curtailment and possibly public criticism, was taken almost in stride. Stream-flow and fuel plants have operated to maximum capacity and storage has been maintained to meet unforeseeable emergencies. Machines at Bonneville and Grand Coulee were operated in excess of ratings. War plants as well as the public were supplied with electricity as though there was no emergency.

In southern California, a similar operating agreement, established to meet the power demands of new electro-chemical and electro-metallurgical installations, has functioned perfectly. Several temporary emergencies when generators have gone out of service, have been met. Here too, power supplies have equaled or exceeded all demands.

These arrangements, involving private companies and a diversity of public agencies, are a real credit to Western power people. The industry should be proud of them and of the men who make them work.

Tax Relief

IRRESPECTIVE of the personal reactions of any of us as individuals when we contemplate our March 15 income tax payments, there is one aspect of the 1942 tax law that is good for the electrical industry. That is the effect it will have on the earnings of power companies. Two points are important: (1) the law held the flat tax rate of 40%; (2) it permits deductibility, for surtax purposes, of preferred dividends paid by operating companies. While both of these are desirable, there are many things the bill might do to relieve the power companies. At present they are discriminated against more than any other class of industry. For proof one needs only examine the current tax ratios. There are power companies here in the West which are paying 35% of their total gross revenue in taxes of all kinds. That kind of treatment killed the goose that laid the golden egg.

Partners, Not Foes

ONE of the Karl Marx falsehoods again is being disproved by the war effort. That fiction of social philosophy is the one which claims that the interests of employer and employee are and must always be antagonistic to each other. Upon this psychological bait many a sucker has been caught, for if a worker can be made to feel sorry for himself, abused, slighted or exploited by management he is easy prey for a "new deal" or a "labor champion." In recent years this philosophy has been widely preached by the social planners.

But the war has taught us all that instead of antagonists, labor and management really are partners in a joint enterprise. If the partners quarrel, the enterprise slows down or fails. There cannot be antagonism between workers and owners of plant when the all-out needs of war must be fulfilled. The Marx philosophy of antagonism is proved a fallacy. Antagonism produces nothing.

But partners must understand each other if they are to work in harmony. It is perhaps in this, as Hugo Bedau points out in his article in this issue, that busy management has failed. It has not always taken its partner, labor, into its full confidence, asked it to share its responsibility with it as well as earnings, for partners must see each other through hard times as well as good. Partners must know each other thoroughly, too, in order to adjust to each other, and in this neither worker nor management has tried very hard.

Perhaps the feeling of unity that has come out of this war will go far toward that better understanding that will return American enterprise to the dynamic, purposeful force that it has been.

WE in business know that free enterprise offers the greatest hope for security and opportunity, the greatest hope for a permanent peace. A regimented economy finds people poor and leaves them bankrupt. Free enterprise finds people poor and brings them more than they had before. A standard of living which has been the hope, the admiration and the envy of the other peoples of the world has been developed in America with democratic processes under the economic system of capitalism. But in spite of the accomplishments of this economic system, there are people who say that this war will end capitalism in the world. They say that after the war the unemployed will roam our streets; that the great new industrial capacity we have erected will be idle and become cobwebbed with disuse; that a huge, strangling national debt will stifle new initiative and development in the great democratic countries of the world; that the horrors and destruction of war will destroy that thing for which we are fighting. Is this the future of our great progressive forward-looking country? It is not my future. It is not the future of the United States. For our country is not ripe to be "pensioned off," now or after the war.—Eric A. Johnston, president, Chamber of Commerce of the United States.

Leagues Move to Avert Manpower Shortage

RMEL establishes labor, equipment and parts pool; Utah league cooperates in school training program

More than 600,000 electrical appliances in the Salt Lake area have a better chance of being in working condition for the duration now that a course in electric appliance repair has been instituted by the Salt Lake City schools working with Leland B. Flint, president of the Electrical League of Utah. Classes are being held at West High school as part of the school's war production training program. They will cover a period of 11 weeks, five nights per week from 7 to 10 p.m.

A survey of repair shops in Utah revealed a shortage of repairmen to keep the appliances sold during the intensive campaigns of the past in operating condition.

Details of the courses were worked out by Flint and Ralph V. Buchman, director of adult education. Both men and women are eligible and approximately 35 men and women are enrolled in the course. The curriculum includes elementary electricity, theory and repair of household appliances, radio and refrigeration service, small motor repair, wiring circuits, etc.

Rocky Mountain League

The Rocky Mountain Electrical League's distributor, manufacturer, utility, contractor and dealer divisions have established a manpower, equipment and parts pool, as a cooperative measure to cope with the scarcity of electricians, mechanics and supplies—a condition that has become serious.

This plan comprehends a listing of firms equipped to do certain types of repair or replacement jobs. Electrical establishments confronted with service problems they are unable to solve because of supply, manpower or mechanical shortages will have only to refer to league headquarters for the name of someone (probably a competitor) who can handle them. The same principle applies to new equipment. Dealers will be supplied with a list of shops carrying types of merchandise suited to customer needs. Many dealers whose service departments can repair or furnish replacements for radios and washing machines, for instance, cannot service vacuum cleaners or electrical kitchen appliances. RMEL's new program will enable any dealer, contractor or other member of the industry to find the missing ingredients.

The league's "information center" substitutes for a training course for apprentice electricians and mechanics at Denver's Opportunity School. Graduates of the projected course would have been furnished jobs immediately by the electrical industry. Arrangements had been completed when it was discovered no trainees were available, because of the government's system of subsidizing every student-mechanic at $75 per month. A further objection was that graduates, after completing their training, would be eligible for employment in the numerous war industries studding the Rocky Mountain West at higher wage scales than the electrical industry can afford to pay.

Despite the fact that the league's cooperative idea will not supply much-needed additions to the ranks of expert electricians, the "share the work" set-up will enable members of the industry to serve the public and escape a multitude of complaints which, in the recent past, have threatened to produce friction.

Christmas Lighting

Although the Rocky Mountain Electrical League will make no attempt to sponsor a "Christmas as usual" observance in Colorado, Wyoming, New Mexico and adjoining states which have previously participated, George E. Lewis, RMEL manager, announced early in November that the league will foster "one Christmas display in every home" throughout the area it serves.

An electrically illuminated wreath, inside or outside a front door or window, is the approved pattern. "It would be a serious blow to both military and civilian morale if we fail to observe the season which represents one of the important things this nation is fighting for," Lewis said. "Religious freedom has always been symbolized by light, and RMEL will encourage modest displays this year, wherever power facilities justify."

● A VICTORY SQUARE program in Seattle, sponsored by the Electric Club of Washington, recently netted sales in excess of $100,000 in U. S. stamps and bonds. Largest purchaser among Electric Club members was L. J. Beneditti, Industrial Electric Co., of Seattle, who bought $5,300 worth. Grover C. Burke, City Electric & Fixture Co., was second high. The program, which advertised the Electric Club, while promoting bond sales, was planned by President Harry G. Anger. Speakers included: Anger, Eugene W. Hoffman, Seattle City Light; R. D. Horning, secretary-manager of the Seattle Electrical Contractors Assn.; William Gaunt, business agent for Local 46, IBEW, and W. F. Cleary, Seattle manager of Pacific Telephone & Telegraph Co.

● ESTABLISHMENT of Tuesday as a "Meatless Day" has brought a new kind of wartime problem to the Electric Club of San Diego. Faced with both a meatless lunch and an increase in price Dec. 1, members were queried by questionnaire; given the alternatives of meeting every Tuesday, meat or no meat; shifting to two meetings per month; changing the luncheon date to Thursday; offering some other solution.

Meetings

Alternate fluorescent materials were discussed by Ray N. Hankins at a recent meeting of the Rocky Mountain IES. At the same meeting Joseph A. Setter, secretary of the local group, gave highlights of the St. Louis convention, and Carl Schranz spoke on blackouts and dimouts. Harold T. Rankin, superintendent of the Denver Lighting Dept. and recently named head of the Colorado Blackout Committee, is the new chairman of the group.

Seattle Section AIEE on Nov. 10, heard Harold S. Osborne, national president, speak on *War Conservation in the Electrical Industry*. He was accompanied by H. M. MacDougal, utility coordinator for the industrial salage section of the WPB's conservation division, who also discussed various phases of the same subject.

Seattle Electric Club members learned about the new building code at their November meeting. Charles Hughes, superintendent of buildings for the City of Seattle, and Harry E. Fowler, senior civil engineer, building department, explained provisions of the code.

The Phelps Dodge picture, *Copper from Mine to Market*, was presented by D. L. Geisert at the November meeting of the East Bay Electric Club.

A Fresno Chapter of the National Electrical Contractors Assn. has been organized by W. J. Varley, field representative, with A. S. Henderson of Hendee Electric Co. as president and Frank Thomas, Valley Electrical Supply Co., secretary.

Stockton, also, organized a chapter of NECA, with Grover Grider, Grider Electric Co., president, and Ed Grogan, secretary-manager.

Renegotiation of war contracts and tire and gas rationing were discussed by Los Angeles chapter NECA recently. Paul Barksdale d'Orr and G. C. Burch were the speakers.

Three dimensional seeing was the subject at the November meeting of the Los Angeles IES. R. H. Lawrence, Dupont counsellor, was the speaker.

L. C. Lange, Leo J. Meyberg Co., discussed *Commercial Sound in Defense Industry* at the Nov. 24 meeting of the EMEA of Southern California.

H. S. Osborne, president AIEE, spoke before the Vancouver section on Nov. 9. His subject was *Construction of Critical Materials*.

Oregon Chapter IES recently heard C. T. Bakeman on the dimout.

PCEA Panorama — Edited by Mary Shoop

Recruit Repairmen

Los Angeles also tackles manpower problem

UNDER the leadership of PCEA, Los Angeles electrical dealers in cooperation with the local office of the United States Employment Service and local school authorities are engaged in a timely program of training appliance repair workers.

Two test schools began Nov. 30 at Frank Wiggins Trade School, Los Angeles, and at Huntington Park High School. Twenty-seven hours of instruction are being given, three hours a night, three nights a week over a three-week period. Fundamental training is offered in the basic elements of electricity, repair of appliances, and the care and use of tools. Demonstrations and practice will aid in preparing the students for their new work.

Classes are conducted in the electrical shop, under the supervision of the school's electrical instructor. Manufacturers are providing special lecturers on individual appliances. The classes are free.

Students are being drawn mainly from three classes, all excluded from demands of military service: physically handicapped persons, women and older men. Training of physically handicapped people is regarded as a promising activity, since they are unfit for war industry work or military service. Women whose family responsibilities do not permit them to assume a full-time position regard this training as a welcome opportunity for a daily part-time job.

Electrical dealers, their shops drained of repair men by war industries and military service, herald this new movement as the answer to their greatest present need. For many, it may mean the difference between staying in business or closing their doors. Further it keeps customers satisfied with the appliances they have, maintaining good will for the future time when sales again will be possible.

Electriquiz

1. In dimout areas, street lights may emit only 5% of their total lamp lumens above the horizontal.
2. How many privately owned California utilities provide gas as well as electrical service?
3. What was the average domestic customer consumption in California on June 30, 1940?
4. What was the average domestic customer consumption in the United States in 1941?
5. What state had the highest average domestic customer consumption on June 30, 1940?
6. What state had the lowest average domestic customer consumption on June 30, 1940?
7. An important expert on lighting is the man with the soap and water.
8. The filament of a small 6-watt 115-volt lamp, such as is used for a night light, is so fine that only the best of eyes can see it.

Answers are on page 87.

Pengilly Resigns

J. H. Pengilly, vice-president of the Square D Co., Los Angeles, now a major in the United States Engineer Corps, has resigned as a vice-president and director of PCEA. Pengilly has been an active participant in association activities and the association regrets his absence for the duration.

H. H. Cleland, president of the San Diego Gas and Electric Co., has been appointed by the PCEA board of directors to succeed Pengilly as vice-president. Frank A. Tracy, president, Sierra Pacific Power Co., Reno, is the new member of the board of directors to fill the vacancy caused by Pengilly's departure.

● PCEA MEMBERS in military service are being retained as members of the association, without payment of dues, for the duration of their service to their country. They are kept in a special service member file, thereby maintaining them on the membership roster so that there will be no interruption in their continuity of membership. President S. E. Gates is writing to each member in service, advising him of this action and extending the best wishes of the association for his activities while away from the industry.

● ROBERT C. WILKIN, Los Angeles manager of Phelps-Dodge Corp., is a new member of the Red Seal adequate wiring committee, replacing A. B. Smedley, Anaconda Wire and Cable Co., who has been transferred to the East.

Who Am I?

I was born in Warren, Ohio, Jan. 17, 1898. I attended grade and high school in Niles, and was graduated from Ohio State University with a B.E.E. degree in 1921. The next year I was principal of the Kings Mills High School, and then taught electrical courses at McKinley High School in Canton for two years. From 1924 to 1926 I was engineer for R. S. Masson, consulting engineer, Los Angeles, and worked with the Needles Gas and Electric Co., Southern Arizona Power Co., and the Culiacan Electric Co., in Sinaloa, Mexico. Who am I?

I joined the Southern California Edison Co. in 1926 and served as station chief at Santa Ana, Fullerton, Chino and Lighthipe substations. I was made dispatcher in 1929, and chief dispatcher a year later. I was appointed operating engineer in 1937, the position I now hold. Who am I?

I have been an active PCEA member for a number of years, serving as co-chairman of the guidance committee of the operating economics section for two years prior to my appointment as chairman for this year. I am a member of the American Institute of Electrical Engineers and the Los Angeles Electric Club. I am married, have three children, reside in Alhambra, and my name is: See page 87.

● A RESOLUTION reaffirming belief in the Uniform Electrical Code as being in the best public interest has been adopted by the board of directors of PCEA. The board also has approved a policy of securing adoption of the code through full cooperation with electrical inspectors. This action was taken following a recent report of the association's code and ordinance committee.

● ONE OF THE REASONS why the recent PCEA conclave in Fresno was so successful was the wide representation from all parts of the industry. Industry-wide participation is shown in the following analysis of the total attendance of 257: Utilities, 151; manufacturers, 64; wholesalers, 13; contractors and dealers, 3; miscellaneous, 26.

NEWS of the industry

FINDINGS ISSUED IN LONG-PENDING UTILITY CASE

Two prime questions in electric rate-making and possible utility take-over by governmental agencies were brought into focus in a valuation finding issued by the California State Railroad Commission on Thanksgiving eve in the Sacramento Utility District case which has been pending since 1938. One is the question of severance damages and the second is the rate-making theory wherein populous urban areas have helped carry back-country rural customers whose welfare is important to an agricultural economy.

The commission, in a 3 to 2 decision, set a value of $11,632,000 for the electric distribution system of the Pacific Gas and Electric Company in the territory embraced by the district, including $1,032,000 as severance damages. Severance thus was set at approximately 9.7% of physical value, which compares with figures of 32% and 24% in the two cases decided prior to this one—valuations for facilities in the municipalities of Redwood City and Fresno. A minority finding by two dissenting commissioners set severance at an even lower figure—$563,000.

In long drawnout proceedings the company had contended that a fair value for the properties including severance was $18,302,981, while the district fixed the value at $9,963,000.

The second point at issue is the conflicting interest of municipalities seeking to embark upon public ownership and the rural customers who have long enjoyed preferential electric rates because of the California commission's theory that only by placing a heavier burden upon the urban areas, could low cost service be furnished to farmers. The two dissenting commissioners held that this theory has no support in law and that it placed an unfair charge upon urban areas such as the Sacramento district, when eminent domain proceedings were undertaken against a private corporation.

However, this view was sharply challenged by Commissioner Justus F. Craemer, who pointed out that the policy pursued by the commission had never been challenged since its adoption, holding that "a productive rural back-country is one of the sound economic life-sustaining factors of urban population . . . . . If the trend of acquisition of electric properties by population centers continues, the ultimate day of reckoning will come when we must face the prospect of the economic destruction of this character of highly desirable rural population."

Either side may challenge the findings in the courts. Normal step for the district is condemnation proceedings in the superior court. However, the $11,632,000 valuation does not represent a purchase price. It is based upon values as of May 21, 1938, when the proceedings were instituted. Since then Pacific Gas and Electric Company has expanded upwards of $1,750,000 on additions and betterments. Also approximately $1,250,000 more would be required by the district for new construction, working capital, shops, supplies, etc. The district originally voted $12,000,000 in bonds to finance the undertaking, and has spent $600,000 on the valuation proceedings.

P. M. Downing, PG and E vice-president and general manager, commenting on the findings, called attention to the manpower and materials shortages, stating that use of these merely to change owners of an electric system could hardly be regarded as meeting a war emergency. He also stated that company taxes paid in the area totaled $240,000 a year. When the bonds were voted originally, he said, customers were promised a 10% rate reduction; in the interim rates have been reduced by the company 30% in the city territory and 15 to 20% in the rural districts.

Tax Exemption Sought in Utility Property Acquisition

A special ruling exempting any governmental agency acquiring the Washington properties of Puget Sound Power & Light Co. from paying federal taxes has been requested of the Treasury Department by the Bonneville Administration.

This action, which follows rejection by Congress of a similar provision in the 1942 revenue act, was disclosed at a recent hearing before the Securities and Exchange Commission on Puget Sound's proposed recapitalization plan.

The hearing brought to light the fact that a group headed by Lehman Bros., investment bankers, was ready to undertake the sale of securities for purchase of the utility properties, provided the tax exemption were granted.

● COMPLETION of a new major 135-mile, 230-kv. transmission line from Grand Coulee to load centers in western Washington has been announced by the Bonneville Power Administration. The line has a capacity of 150,000 kw.

INTEGRATION AVERTS POWER SHORTAGE IN NORTHWEST

Through coordinated operation of all utility systems in the Pacific Northwest the effects of unprecedented drouth conditions during four summer and fall months were minimized and the power curtailment obviated. During the period generators at the Bonneville and Grand Coulee dams furnished as much as 40 to 50% of the entire power requirements of Oregon and Washington.

Flow of all major streams in Washington and Oregon except the Columbia River dropped to an average of 14% below the most critical water year of record. Digest of weather reports for August, September and October showed that precipitation in Oregon in August was one-sixth that of August, 1941. Rainfall was below normal everywhere west of the Cascade mountains. September was the third driest on record. October also was considerably less than normal. In Washington August rainfall was one-half normal and September was the driest on record.

Stream flows in the two states ranged from 7 to 42% less than the minimum of record. In the Columbia, however, flow was 22% above the minimum in August, 10% above in September and 15% for the first half of October.

During the critical period when Bonneville and Grand Coulee machines ran 10% overloaded, reservoir supplies of the utilities were conserved to meet demands when cold weather causes further drops in stream flow. During the last month fuel plants have been operating close to capacity supplementing the available stream-flow hydro.

Over 500 million kwh. were delivered to major utilities in Oregon and Washington during the dry months from the Bonneville and Coulee plants.

● IN AN OPEN LETTER to engineers, University of California War Training Office asks that they tell their wives and daughters of the urgent need for women in war industry. Training is available to prepare college women in drafting, computing, time and motion study, industrial laboratory techniques and as engineering and scientific aids, the letter says. Courses are tuition free.

● A CONTRACT amounting to $12,000 for installation of a power system at a West Coast elementary flying training school, has been let the British Columbia Electric Railway Co. Ltd., Vancouver, by the Department of Munitions and Supply.

IN DEFENSE OF THE HOMES WE HELPED TO BUILD

Striding along with Uncle Sam on his march to Victory are the Men of Thermador, zealously turning out products of war—helping to defend the homes they helped to build.

From the lessons of war will come even greater Thermador products of peace to bring warmth, comfort, convenience, and economy to the American home. • • •

Industrial electric heating units in various types and sizes are available to war industries.

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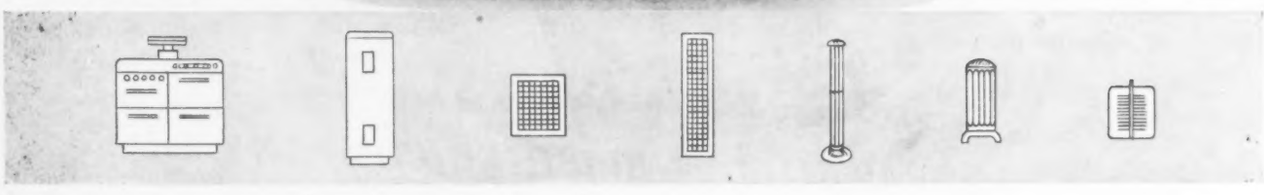

How Sally used up a copper mine

LOOK at the picture carefully. See that elbow-rest under Sally's arm?

It is significant. In fact, it's a humble sermon on war production.

Understand the existence of that arm-rest and you understand one of the basic reasons why, in less than seven months after war-conversion, American industry is hollering for Washington to provide more copper and other basic raw materials.

► Before Sally got her arm-rest, she reached over to a box, picked up a tiny part for an airplane instrument and placed it in the machine . . . Now the supply box is tilted and constantly jiggled, so that the parts flow to her finger-tips. With each motion Sally saves a fraction of an ounce of energy and half a second of time.

Without such tiny savings of time and effort, America's 20,000,000 factory workers would be hopelessly handicapped in their race against the millions at work with a head-start of years in Germany, Japan and Italy.

► The muscle-misers and second-savers of our factories come in handy in this war, when splitting seconds in production is as important as it is in battle.

Who are the men that provide the arm-rests, jiggle the supply-boxes, conduct the ceaseless hunt for wasted half-seconds and needless human motion?

► They are the "methods" men of industry. They have all sorts of titles: plant managers, operations managers, methods engineers, efficiency engineers, etc. But their job is "to manage men and machines to save time and materials."

In peace, these men were the core of the industrial system that gave you the world's highest living standard at the world's lowest cost in hours of work.

► In war, these same "methods-managers," with the intelligent cooperation of American workmen, are cutting years from our arming task by splitting seconds from its millions of individual operations. This example of time-saving is just an indicator of what a plant operating man does. Such men have many other jobs, including the important job of plant maintenance, but "second-splitting" is the field in which they are the envy of the whole world.

The American Production Manager is the product of the American industrial system. Complex, loose-jointed and aimless though our system may seem to the theorist, it meets every challenge, because it is the best system ever devised by man for discovering, developing and rewarding individual initiative.

Reprints of this advertisement are available in handy booklet form.

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WASHINGTON, and other large city newspapers were used for the advertisement shown opposite, because government and public need to understand the asset which America has in its trained industrial staffs.

Read what we said about "methods management" in the advertisement, then ask yourself the secret of American genius for production economies in men, materials and time.

One big advantage we have in this country is the interchange of know-how between industries. If an instrument maker reduces a fourth-class hand motion to third-class, all other managers of small part assembly can, and do, find out how it was done.

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• Now is the time to wage war on waste. Food conservation—labor, fuel and energy can best be done the electric way.

Many users of Lang electric commercial cooking appliances tell us of their experiences in saving, speeding up operations and in turning out better quality meals. Lang construction assures long life and efficient operation. Lang automatic controls save time and effort of chefs.

Today, Lang is building for the army, navy and—Victory. These orders are the FIRST orders of the day. However, we can take care of our commercial customers, too.

We urge anyone considering the purchase of Lang electric equipment to plan ahead and order ahead.

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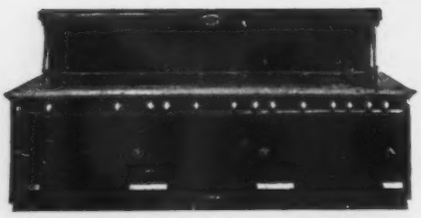


WESTERN PROJECTS HALTED BY WPB ORDER

Western power projects affected by the WPB order halting all non-military government construction included Grand Coulee, Shasta Dam, Davis Dam and Anderson Ranch. Under the order some or all planned additions to these projects have been halted.

Installations at Grand Coulee will cease when Units 4, 5 and 6 are installed in 1944, supplementing the present three 108,000-kw. machines and the two 75,000-kw. units transferred from Shasta Dam. These latter two units will begin power production in December and January. Affected by the order are Units 7, 8 and 9 for the left bank power house and all machines in the right power house. Construction work on the latter has ceased entirely.

At Shasta Dam only two 75.000-kw. machines will be installed, the third machine having been eliminated in the new order. The Keswick Dam power installation consisting of two 25,000-kw. machines also was deferred. A 97-mile transmission line from Shasta Dam to Oroville is authorized.

Davis Dam with 225,000 kw. was removed from the list of approved projects, as was the 27,000-kw. Anderson Ranch development on the Snake River in Idaho. Green Mountain Dam in Colorado, with 21,600 kw. will continue.

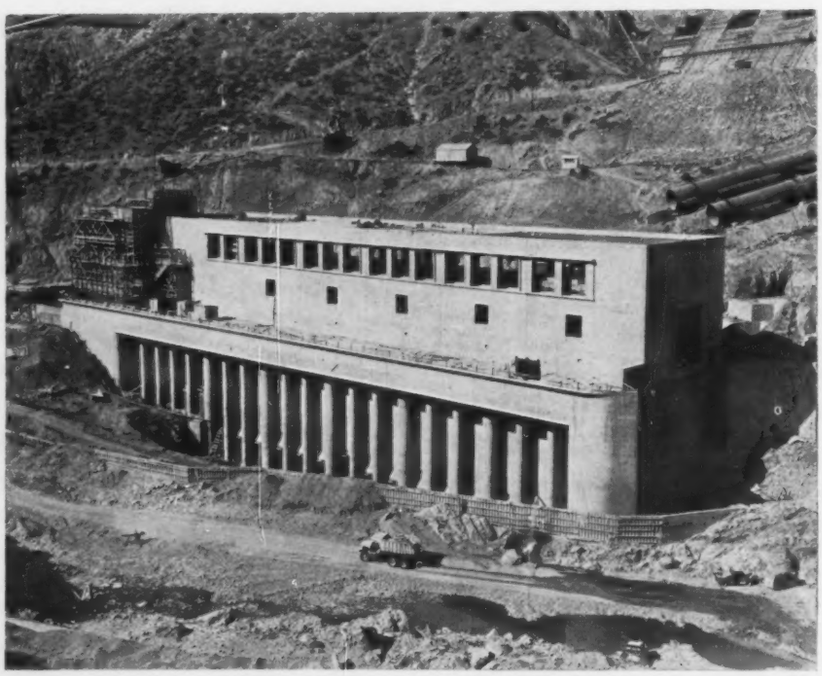
Parker Dam will continue as scheduled with four 30,000-kw. units. Boulder Dam will be brought up to 1,034,000 kw. with the completion of work on units A-5 and N-7, both of which are rated at 82,500 kw.

The WPB order was aimed primarily at Federal construction outside the power field, inasmuch as the power program had been culled down in August and non-vital jobs limited to operations which could proceed with the materials at hand. Projects having an A-6 or lower priority rating had been proceeding with such materials as they had; now they must stop.

Bonneville Projects Exempted From WPB "Halt" Order

Bonneville Power Administration's projects directly related to war industries have been exempted from the WPB order halting all non-military construction. Involved are some 23 projects involving transmission lines or substations.

The Facilities Review Committee of WPB issued an order to the Interior Department to ignore the original order until a decision was reached in a review of the situation. Dr. Paul Raver, Bonneville administrator, made an appeal in which he pointed out that all non-essential elements were eliminated from the Bonneville program some time ago.



Installation of the first two units at Shasta power house will make available 150,000 kw. early in 1944. Ultimate capacity of the plant, part of California's Central Valley Project, is 375,000 kw. (USBR photo)

From the Atlantic to the Pacific

G-E WIRING MATERIALS DISTRIBUTORS

Are Eager to Co-operate in Aiding the War Effort

G. E. White, sales manager, Central Electric Supply Company, Battle Creek Mich., G-E distributor, among other services, helps local plant engineers and maintenance men to keep their wiring systems in first class condition by supplying materials and helpful service as needed.

G-E Wiring Materials Distributors offer a wide variety of conduits, boxes and fittings, wire and cables and wiring devices for war work. Included are materials for wiring system maintenance . . . for wiring system conversion . . . for new wiring. One of these distributors is located near you assuring convenient contacts and friendly service.

Talk with a representative of this G-E Wiring Materials Distributor about your wiring problems. You'll find his knowledge of new developments and methods helpful. He'll be glad to make wiring suggestions . . . to help plan wiring . . . to help select materials . . . to follow delivery schedules personally.

Behind G-E Wiring Materials Distributors stands the General Electric Company recognized everywhere for the quality of its products. Continual research keeps G-E materials up-to-date. Therefore the materials handled by G-E Wiring Materials Distributors are sure to meet your wartime needs.

J. A. Ackerman (right), A-B Electric Supply Co., Morristown, N. J., G-E distributor, is here helping W. G. Nordling of C. P. Dean, Inc., Summit, N. J. select suitable wiring materials for an important rush job.

The G-E wiring materials field force is divided into geographical districts in order to provide greater help for distributors and their customers. Here is J. O. Wetherbie, manager of district No. 2. His headquarters are in New York, N. Y.

Three generations of Cahn's are active in the Cahn Electric Co., Shreveport, La., served by the Shreveport General Electric Supply Corporation. Cahn Electric has done war work in excess of $1,000,000 the first nine months of 1942, finishing on schedule or before, and using G-E wiring materials. Seated in photograph: A. S. Cahn (left), partner and Carroll Cahn, father of the Cahn brothers. Standing, left to right: D. B. Young, salesman, General Electric Supply Corporation, Shreveport; G. A. Burton, auditor and expeditor; J. G. Harriss, supt. and chief estimator; A. S. Cahn, Jr., 3rd generation; H. E. Cahn, partner.

SEE YOUR G-E DISTRIBUTOR

The nearest G-E Wiring Materials Distributor will be glad to give you information about G-E conduits, wires and cables and wiring devices suitable for your particular needs. General Electric Co., Appliance and Merchandise Dept., Bridgeport, Conn.

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in speeding the war program by using Reliable Straightline splices on new construction and on maintenance.

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UTAH RATE VALUATION HEARINGS UNDERWAY

Hearings before the Utah State Public Service Commission began Nov. 16 and were scheduled to run two weeks or more on a commission-instigated complaint against Utah Power & Light Co. seeking substantial reductions in rates. At issue is the valuation of the company for rate making purposes, based upon an original cost value determined by the Federal Power Commission.

In early sessions testimony was introduced by both FPC staff members and company officials relating to various methods of valuation. The Utah commission counsel announced at the beginning of the hearings that a reduction of upwards of $1.000,000 would be sought in present rates.

FWA Offer Clears Way for City Light Project

Upon request of Superintendent E. R. Hoffman, the Seattle City Council has voted to accept a Federal Works Administration offer of $1,864.760 to aid in construction of City Light's Ross Dam addition. Hoffman filed with the council a written agreement under which the federal body offered to furnish the sum as an outright grant, apparently on the ground that it is a war necessity.

The FWA asserts in its grant offer that the donation is based upon an estimated total cost of $10.164,760, and is to take care of the excess cost, as reflected in bids opened last August, over the original cost estimates.

City Light proposes to raise the rest of the money by an issue of utility bonds and a contribution of $300,000 or $400 000 from its surplus earnings. Bids will be advertised for the construction contract and for the City Light bonds.

"After we get these bids," Hoffman declared, "we can decide whether the prices quoted justify the award of a contract and going ahead with the improvement."

Trial Date Set in Utility Condemnation Proceedings

May 3, 1943, has been set as trial date for condemnation of Puget Sound Power & Light Co. properties in Clallam County by Clallam County PUD. Puget Sound had asked deferment since it lacks manpower to prepare its case and use of company automobiles is limited to construction and necessary maintenance.

Superior Judge H. G. Sutton of Kitsap County stated that he was inclined to agree "that this is no time for condemnation actions which merely transfer property from one owner to another" but that he had no alternative. "if one of the litigants insists, but to let it come to trial."

Company holdings have been condemned in Whatcom, Thurston, Lewis and Cowlitz counties, but the PUDs have not financed the transactions after winning condemnation awards.

OPA Announces Regulations for Utility Rate Increases

Regulations governing notification of general utility rate increases have been issued by the OPA. Price Administrator Leon Henderson has ruled that a general rate increase is one which affects a class of customers as distinguished from an increase chargeable to a particular customer under special arrangements.

Notices informing OPA's Transportation and Utility Division must be filed before authority for a rate increase is sought from a local body, and they must contain written permission for OPA to intervene. Such notices must be accompanied by a mass of supporting material all of which is outlined in OPA Procedural Regulation 11, effective Nov. 12.

Washington Rejects, Oregon Accepts PUD Propositions

In the Nov. 3 general election, Adams County, Wash., rejected for the third time a proposal to form a PUD. Incomplete returns, but sufficient to write the answer conclusively, showed 500 favorable votes to 762 against.

Adams County turned down a similar proposal in 1938 by a margin of 75 votes and in 1940 by a margin of 109 votes. This territory is served by The Washington Water Power Co.

On a proposal to authorize $925.000 of revenue bonds to set up the Union County, Oregon, PUD in the power business, voters acquiesced by a vote of 2,285 in favor of the bonds to 2,199 against. The same bond issue failed to be authorized by the voters in the May primary election by a narrow margin. Eastern Oregon Light & Power Co. serves the territory.

● Bonneville Power Administration and the Clark County (Wash.) PUD have signed a contract for 10,000 kw. of prime power to enable the PUD to serve the Vancouver housing project and any additional war industries that might locate in the region. The contract supersedes one signed in April, 1941.

● With 278,366,000 kwh. transmitted during the 31-day period, Grand Coulee Dam hit a record high power production in October, it is reported by the U. S. Bureau of Reclamation.

A Miller Message to help conserve War Production Manpower

Better Lighting could have saved this hand!

11,600 industrial workers are killed or injured *every day!* Many of these tragic accidents happen simply because workers cannot see clearly and sharply at all times. Read how every alert electrical man can help save lives, protect skilled labor, and speed war production with MILLER lighting . . .

Last year industry lost 42 million man-days through injuries alone! Think of the staggering cost to the war effort.

Better lighting is one positive way to reduce industrial accident hazards. In one war plant, for example, accidents decreased 11% after a new lighting system was installed. In another the frequency of minor accidents dropped nearly 54% when illumination was increased 18 foot candles.

These figures are from WPB's useful handbook, "Plant Efficiency."

MILLER 50 FOOT CANDLER or 100 FOOT CANDLER will provide an adequate, clear-seeing level of fluorescent *daylight* for busy war plants. Watch what that can do for worker morale and safety programs!

Or it may be some other type of MILLER lighting . . . incandescent or mercury vapor, for instance...is more ideally suited to your customers' needs. MILLER works with all light sources and is in an unbiased position to give you the one best lighting system for each individual project.

MILLER engineers are located in principal cities. Ask to have one call for a serious discussion of how you can use better lighting to help your industrial accounts.

BUY U. S. WAR BONDS

Pioneers in Good Lighting since 1844

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MANNING TABLES OFFER SOLUTION TO LABOR PROBLEM

With formal release last month of a procedural outline for setting up individual-plant "manning tables," utilities and other essential war industries have at their disposal the government's latest device for effecting an orderly withdrawal of draftable, key workers from war plants.

Hinted at and discussed informally for months, the plan is based on the blunt proposition that "needs of the armed forces will compel the eventual induction of practically all men who can meet the age, physical and other requirements; these men must be released by industry."

The manning table procedure is intended to provide "the basis for withdrawal of such workers at a rate that will allow others not suitable for active service to be trained to replace them."

Fundamentally, a manning table is a list of different jobs in a given plant, with each type supported by appropriate data. It records the type of worker needed to fill a specific job, the skill, training and experience needed to fill each job, essential characteristics workers need to do jobs properly, and the length of time required to train a replacement for any given job on the list. Obviously, the table which is left after management-government conferences bring approval for any specific proposal, will be a compromise.

After obtaining permission to participate in the plan, utilities draw up manning tables on forms provided by WMC and submit five copies to the regional WMC director. When validated, a copy of the plan is forwarded to the state Director of Selective Service holding jurisdiction. His approval is required before the table will have any effect on any Selective Service activity.

On acceptance, the state director will assign the utility a state acceptance number which shall be listed on occupational deferment requests for all workers of military age, (Form 42A). This number will give local draft boards notice that the employer's plan for worker replacement has been drawn along approved lines.

Currently, even without a state acceptance number, Form 42A is written evidence of the occupational necessity of the registrant for whom it is filed. Thus far, board actions on these requests, however, have been so spotty as to bring considerable confusion.

Both Paul V. McNutt, WMC director, and Draft Chief Lewis B. Hershey hope for very definite changes in the present, uncoordinated methods with which local boards handle 42A requests. Both hope that voluntary use of manning tables will be so widespread as to send a flood of state acceptance numbers over local boards' desks.

Conversely, Washington is looking toward the day when a request for occupational deferment without an acceptance number will get correspondingly short shrift from the local board.

Meanwhile, WMC's technical committee, which took over establishment of lists of critical occupations from Selective Service, has scheduled a review of Occupational Bulletin No. 9, which classified the electric utility industry as essential and listed 86 occupations therein as critical.

FPC to Oversee Government Power Supply Contracts

Federal Power Commission has been formally designated by President Roosevelt as "overseer" of all Government contracts for war power supply. The action puts into operation the President's "suggestion" that war plants and establishments contract directly with the cheapest power source, using "common carrier" transmission over other utility lines if necessary to reach the consumer.

The President's instructions to FPC direct the agency to:

1—Review all power contracts proposed by the War Production Board, War, Navy, Maritime Commission, National Housing Agency or Defense Plant Corp.

2—Determine whether cheaper power supply is available and how it can be delivered, and to issue necessary orders to provide for the cheaper supply "after consultation with War Production Board as to priorities and allocations."

3—Determine whether—in instances where cheaper sources are not available—rates and conditions of proposed contracts are reasonable and, if unreasonable, to fix proper rates and terms.

4—Review and renegotiate existing contracts in accordance with the same procedure.

The President's action came in the face of reportedly strong recommendations by WPB that if any such policy was to be made effective it should be administered within the framework of the April 30, 1942, "treaty" between WPB and FPC which gave the former full jurisdiction over power supply for war plants. In view of WPB's stand and the fact that the President failed to mention the "treaty" in his instructions to FPC, the White House instructions are considered tantamount to a major revision of that agreement.

● Early in November Bonneville Power Administration energized a 17-mile, 115-kv. transmission line in western Washington six weeks ahead of schedule to avert a threatened power shortage.

Curtis "Fluratex" Non-Metallic Reflector Unit with "Fluracite" Reflecting Surface illustrated: Cat. No. 1508.
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For America's biggest job, industry seeks assurance of the best in fluorescent lighting. Many of the finest recent installations utilize "Fluracite," the reflecting surface with these superior qualities:
"Fluracite" stays white. It will not change color under normal use. It is a tough, mineral-hard surface maintaining extremely high efficiency. This baked synthetic reflecting surface has been proven by successful use on Curtis Fluorescent units for four years.
"Fluracite" is especially well suited to Curtis industrial units with chip-proof non-metallic "Fluratex" reflector. It will pay to call in the Curtis representative on your next industrial lighting problem.
Now available to the electrical trade is "Curtis Lighting for Vital Industry," a booklet which describes our newest, most efficient equipment for any industrial lighting requirement, including powerful Silver Mirror glass reflectors for use with incandescent lamps. Send for your copy—on your letterhead—TODAY.
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Provide a *Safety Factor* TO CONSIDER IN ALL INDUSTRIAL INSTALLATIONS—

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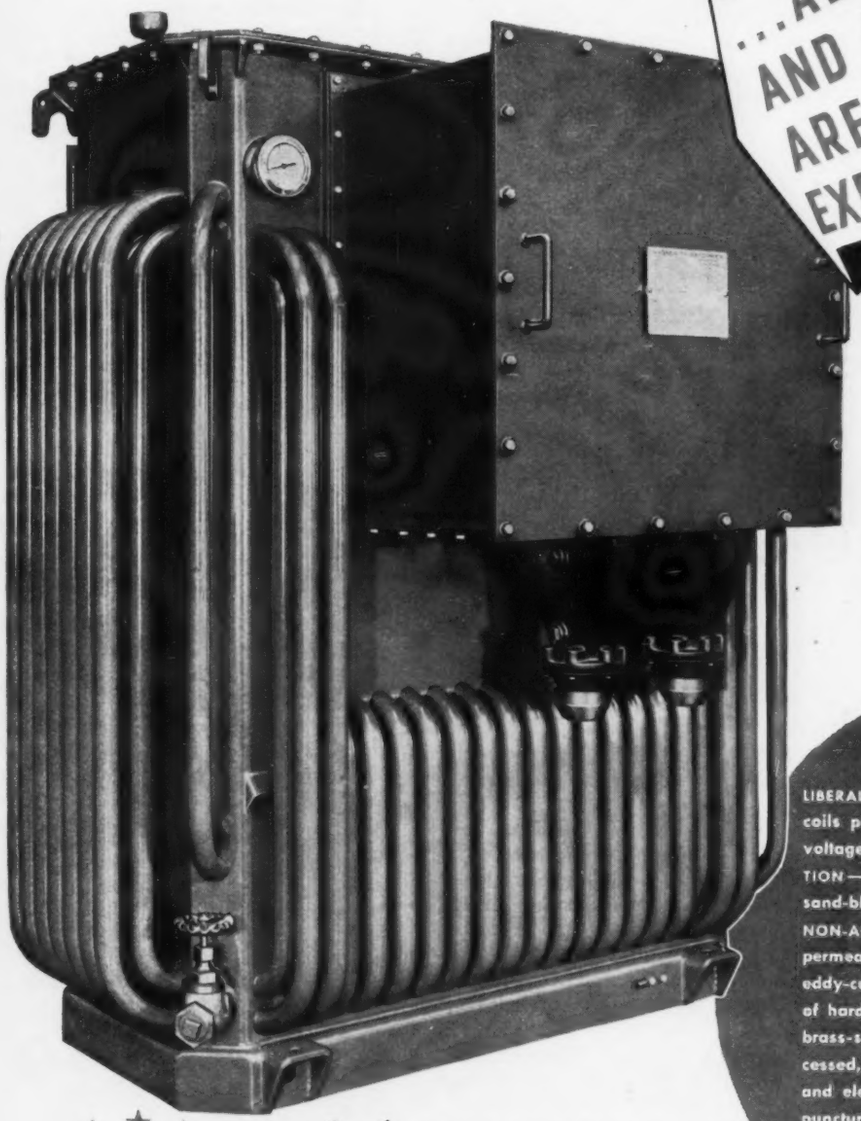
...ALL BUSHINGS AND CONNECTORS ARE SEALED—NO EXPOSED LIVE PARTS



Wagner transformers can be furnished with junction boxes, "tailored" to meet any installation requirement.

These junction boxes eliminate the expense of purchasing and installing separate devices, save valuable room and installation time, and add the SAFETY of entirely metal-clad apparatus with no exposed live parts to cause damage or injury.

Features

LIBERAL INSULATION—extra end-turn insulation on coils provide protection against line surges and voltage disturbance . . . HEAVY TANK CONSTRUCTION—heavy steel plate, electrically welded, sand-blasted and flow-painted . . . CORE IRON OF NON-AGING SILICON STEEL—has high magnetic permeability and has very low hysteresis and eddy-current losses . . . STATIONARY CONTACTS—of hard-drawn copper, sweated and pinned into brass-shouldered studs . . . BUSHINGS—wet-processed, solid porcelain with sufficient mechanical and electrical strength to carry the load without puncturing . . . TRANSFORMER OIL—has high dielectric strength, proper viscosity, safe flash-point, and will not sludge.

Send **FOR BULLETINS TU-180 and TU-181 illustrating and describing the complete line of Wagner Transformers.**

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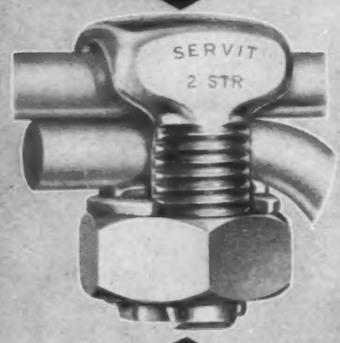


WILL SPEED UP
YOUR HOOK-UP
BURNDY 107 EASTERN BLVD. NEW YORK CITY

GENERATOR "SEIZURE" IS FRIENDLY GESTURE

So-called "seizure" of two 35,000-kw. turbo-generators in the Long Beach No. 2 steam plant of the Southern California Edison Co. for shipment to Russia, was a friendly gesture to insure immediate consummation of a deal that might involve months of legal difficulties. By this process work of dismantling the units for shipment can be started and the whole proceedings, which have been under consideration for some months, can be speeded up.

The Russian power requirements could best be met by taking the Long Beach units since they conformed in both size and frequency to the specifications and were readily available. Otherwise there would have been a long wait while new units were constructed.

Overall power supply in southern California will not be affected because Edison is to receive as a replacement for the machines going to Russia a turbo-generator originally purchased by Union Electric of St. Louis and re-allocated under the August realignment of capacity. Because it will be operated at either 60 or 50 cycles, the machine is dual rated. It is a 17-stage, single-casing, hydrogen-cooled, 80 000/67,000-kw., 13.8/11.5-kv., 1,800/1,500 rpm. General Electric unit designed to operate at 375 psi and 700° F.

The two 35 000-kw. units being shipped to Russia were installed originally in 1925.

PG and E Employees Vote In NLRB Elections

Before the year's end all employees on the Pacific Gas and Electric system will have voted in NLRB elections to select a collective bargaining agency from either the CIO Utility Workers Organizing Committee or the AFL International Brotherhood of Electrical Workers. New elections are scheduled for seven divisions and re-runs in one division and in the Emeryville shops where neither of the labor organizations received clearcut majorities in previous elections.

In the most recent elections, results of which were just announced by the NLRB, the IBEW was selected by employees in the Drum, Shasta, and Humboldt divisions and by the system-wide general construction division. In the Sacramento division a re-run will be held due to failure of either organization to secure a majority because a number of employees voted that they wanted representation from neither of the unions. In the elections decided the ratio was 6 to 1 in favor of the AFL union. Only in the East Bay division and in the company's bureau of tests has the CIO union been victorious.

Elections are to be held in the Stockton, San Francisco, San Jose, North Bay, DeSabla, Colgate and Coast Valley divisions. Approximately 3,100 employees are involved.

Throughout all of the labor negotiations the company has held that collective bargaining should be on a system-wide basis rather than with each separate division. The NLRB has opposed this position.

● In the latest reorganization of the WPB, the Power Division under Acting Chief Herbert S. Marks remains intact but is grouped with five other former branches in the newly-created Construction and Utilities Bureau. Head of this bureau is John Hall, former vice-president of American Radiator and Standard Sanitary Manufacturing Co., who recently has been special assistant to WPB Vice-chairman James S. Knowlson.

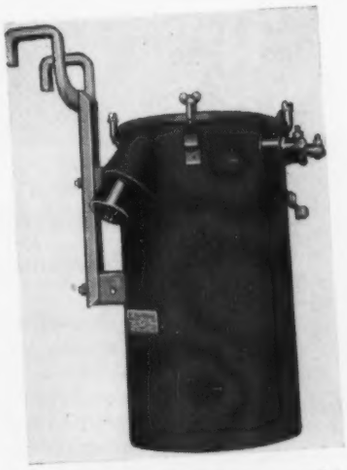
The new bureau includes, in addition to the Power Division, groups for plumbing and heating, building materials, lumber and lumber products, transportation equipment, communications equipment and governmental requirements.

● Federal Power Commission has issued its fifth annual edition of statistics of electric utilities covering the year 1941. The 500-page volume presents detailed financial and operating information on 374 electric utilities having total book assets of $17,794,542,310. Companies included represent 95% of the privately owned electric utilities in the country, it is stated. The book, referred to as FPC S-25, sells for $2 and may be secured from the Federal Power Commission.

● An Expenditure of $15,120 for purchase of additional equipment for the Victoria Park substation has been recommended to council by city commissioners at Calgary, Alta. A contract for four 1,000-kw. transformers at $3,625 each, plus $620 for four gas detector relays, in all probability will be awarded R. L. Brews. The purchase will be made contingent on the city's obtaining the necessary priorities.

● The City of Chelan, Wash., must pay the 3% sales tax on all personal property it buys from Washington Water Power Co., according to ruling of Attorney General Smith Troy. Chelan is negotiating to buy a water system from the power company, and since the sale is a voluntary transfer by the utility to the city, it is subject to the sales tax, Troy said.

Uptegraff Transformers



Uptegraff UD Transformer complete with hanger.

Uptegraff UD Transformer, 75 KVA

STANDARD NEMA/EEI
Type UD
DISTRIBUTION
Transformers
1½ to 100 KVA

Adapted for mounting directly on pole, or suspended by hangers from crossarm.

Cylindrical, electrically welded all-steel tank; circular coil, cover crowned, bottom set up into tank—positive year-around outdoor protection.

Every modern feature for the highest performance in Distribution Transformers is designed and built into these Uptegraff units.

Continuous service, highest standard of engineering practice, and every detail of design worked out to the Uptegraff requirements of "Quality and Service."

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The Uptegraff line includes Transformers of every type for every purpose. Tell us your requirements; let us send you Bulletins on Uptegraff Transformers for your particular purpose. Representatives in principal cities.

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Jeffries Transformers

Reasonable in Price
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Jeffries large transformers are priced reasonably—and you can save their first cost in a short time by minimizing current losses. When you use a Jeffries transformer, you can provide voltage change at the point desired, without prohibitive expense.

We supply all types and sizes. If not in stock, we build to order in a hurry—a week to 10 days.

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PAINE "SUDDEN DEPTH" DRILL BITS

3/16" to 1⅛" Diameter

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Cut Drilling Time 50 to 75% In Masonry and Concrete

Use PAINE "Sudden Depth" Drill Bits in any rotary drill slow-speed—and get accurate-size, uniform holes in a jiffy. A definite safeguard against costly wall fractures. Quiet in operation. Holds edge for a surprisingly large number of holes. Don't delay—order yours TODAY.

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FASTENING and HANGING DEVICES

PEPCO REORGANIZATION PROCEEDINGS RECESSED

Reorganization proceedings for Portland Electric Power Co. before the Securities and Exchange Commission in Philadelphia were recessed the middle of November for two months. SEC approval of the reorganization is necessary before it can be submitted to the U. S. District Court in Portland. When hearings are resumed they probably will be held in Oregon.

Two significant points were brought out during the hearings. One was the relative value placed on the properties of the Portland General Electric Co. by the company and by Bonneville Power Administration in the negotiations between the two for a long-term power contract. The PGE management held out for a purchase price of $59,900,000 to be incorporated in the contract. Bonneville offered $54,400,000. Testimony, however, indicated that the two parties were closer together in subsequent negotiations.

Second point was the attempt by Bonneville Power Administration to secure from the Treasury Department Internal Revenue Bureau a ruling on tax exemption of a non-profit corporation such as might be set up to purchase properties of privately-owned utilities.

Colorado Farmers Promised Cheap Power by U.S. Senator

Signs of the times: "Every farmer in Colorado eventually will have electric power at one cent a kilowatt-hour," declared recently elected U. S. Senator Ed C. Johnson at a November meeting in Denver of the State Rural Electrification Executive Committee. Present at the conference was Dr. R. B. Craig of St. Louis, Mo., deputy administrator for the national REA, who is arranging for an immediate survey of Colorado to determine what rural projects are needed to supply the state's farmers with electricity.

Dr. Craig said: "At least 18 months are required for the development of each rural program, so we must begin now preparing for postwar electrification. . . . The state's 19 cooperative groups have repaid all their due federal loans to date, plus an advance payment of $81,000. They now supply electricity to 28,000 farms. The electrified areas are proving how important electric power is in helping to produce food and alleviate the manpower problem during war times."

Senator Johnson, in a press interview, publicly pledged full support to the Colorado REA projects now in the survey-and-study stage.

The State REA conference is the third "sign of the times" on the REA front in Denver within a month—all with the same general objective. In October the Colorado Electrification Assn. held its annual convention to draft proposed laws to by-pass statutes protecting stockholders of private electric utilities. More recently Nebraska Democratic Congressman Clyde T. Ellis, defeated for re-election, paid a condolence visit to Colorado's Republican Governor Ralph L. Carr, defeated in his race for U. S. senator by the incumbent Ed Johnson, and prophesied that rural REA cooperatives will reach 98%, instead of 39% of Colorado farms. Ellis is the newly-elected manager of the National REA Cooperative Assn. Added interest to the Ellis-Carr incident lies in the background that Ellis introduced the highly controversial Arkansas Valley Authority in Congress at the last session, and Carr stumped the state to defeat it.

Puget Sound Stockholders to Vote on Reorganization Plan

Stockholders of Puget Sound Power & Light Co. will vote Dec. 15 on the question of issuing new bonds and debentures totaling $60,000,000 to refinance the utility's present first and refunding bonds. It is estimated that savings of $1,200,000 annually in interest and amortization charges would result.

The refinancing is contemplated as a step toward complete recapitalization of the Seattle company and readjustment of its stock arrangement. Under a plan filed with the Securities & Exchange Commission, Engineers Public Service Co., the parent firm, would relinquish control of the present preferred stockholders, approximately 12,000 of whom reside in the state of Washington. Engineers would be left with ownership of but 3% of a proposed new issue of common stock as compared with a present holding of 99.3%.

● VANCOUVER, B. C., has about 8,000 cast iron lamp standards on city streets. On the average about one of these is broken every week. With supplies of these standards frozen by the Canadian metals controllers, no new standards are available; and in the future broken units will be replaced by wooden poles. Each cast iron standard contains about 660 lb. of metal.

● AMONG INITIAL ORDERS for a new Naval hospital at Pleasanton, Calif., was $20,000 for porcelain conduit boxes and fittings. It is reported that the entire construction of the $20,000,000 project may involve an all-porcelain wiring job.

Answer to "Who Am I?"
(See Page 73)
H. A. Lott

Electriquiz Answers

1. False. The figure is 10%.
2. Four—Pacific Gas and Electric Co., San Diego Gas and Electric Co.; Coast Counties Gas and Electric Co.; Needles Gas and Electric Co. Source: California Railroad Commission.
3. 1,016 kwh. Source: Edison Electric Institute analysis of residential service, Sept. 5, 1940
4. 986 kwh. Source: EEI estimate.
5. Idaho—1,738 kwh. Source: Same as No. 3.
6. Rhode Island — 616 kwh. Source: Same as No. 3.
7. True. Keeping fixtures clean is essential to maximum efficiency.
8. True. Thinner than a hair, it has a diameter of less than 5/1000ths of an inch.

● ORIGINAL COST of Inland Power & Light Co.'s Ariel Dam on the Lewis River in Washington was placed at $8,202, 982 in a Federal Power Commission order issued last month. The company had set the cost at $8,691,204. Among disallowed items were $77,977 to Electric Bond & Share Co., parent concern, for engineering and other services and $259,118 to Phoenix Utility Co., Bond & Share subsidiary, for construction fees. The dam was licensed by the Commission in 1929 and has an installed capacity of 55,000 hp. It is leased and operated by Northwestern Electric Co.

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PEOPLE
made this news

Puget Sound Power & Light Announces Staff Changes

Puget Sound Power & Light Co. last month announced the retirement of three long-time employees and promotion of several others.

Retiring are Gen. H. G. Winsor, personnel officer, Frank Seibert, assistant treasurer, and R. W. Clark of the sales department. Winsor will give full time to his duties as director of the War Manpower Commission for Oregon and Washington.

Personnel work in the future will be in charge of Clarence Sherman, assisted by Louis Matter and George Rideout.

J. L. Marzluff, formerly Renton manager, was named transportaton coordinator in the office of L. E. Karrer, a vice-president. Others appointed to assist company vice-presidents are K. E. Hollingsworth and Harry Klein, assigned to the office of Vice-President Patrick Johnson; M. A. Foster, assistant to C. F. Terrell; and H. I. Lewis, assistant to Cecil Webb.

Personnel shifts in the engineering department have affected R. A. Walker, R. A. Church and Don Misz. Walker was promoted from central division service supervisor to assistant general superintendent. Church has taken over Walker's former duties and Misz has been transferred from the general engineering department to Everett as assistant superintendent there.

Roger A. Walker, superintendent of service for Puget Sound and perennial secretary of the Electric Club of Washington, was advanced to assistant general superintendent and will work directly under Al Pollard, general superintendent.

● DR. WILLIAM MONROE WHITE, internationally known engineer and well known on the West Coast, has retired as manager of Allis Chalmer's hydraulic turbine department. Appointment of J. Frank Roberts, former head hydraulic engineer of TVA, to succeed Dr. White and of H. P. Binder as manager of the centrifugal pump department has been announced by the company.

● CECIL A. PENNEY has joined the Clark County PUD and will supervise installation of electrical equipment and apparatus in the new Vancouver defense housing project. Penney formerly was chief clerk at Astoria for Pacific Power & Light Co.

● FRED J. HUME, head of the big electrical engineering and contracting firm of Hume & Rumble Ltd., Vancouver, New Westminster B.C. and Edmonton, Alta., has announced his retirement as mayor of New Westminster B.C. He has been mayor of the Royal City for nine years and has been 18 years on the Council. He was first elected to the City Council in 1923 and, with the exception of one year, headed the polls on each of the nine occasions he ran as alderman. In all he has been elected to public office in the City of New Westminster twenty times. A year ago he refused nomination for election as mayor of the city of Vancouver. Concurrently with his announcement that he would retire from the mayor's office at the close of this civic year, Mr. Hume has accepted chairmanship of the New Westminster Advisory Committee on Construction of Aircraft.

● TO FILL GAPS made by calling of men to war services, the sales department of Pacific Gas and Electric Co. at headquarters in San Francisco has made the following changes: Wayne Clark, administrative assistant to General Sales Manager O. R. Doerr, has been made merchandise manager to fill the vacancy made by the leaving of Capt. Arthur Miller. Gus Stricker becomes administrative assistant. R. I. Mendes, one of the company's old-timers, who has been doing priority work in the purchasing department, moves to the general sales department.

● SHIFTS IN ACCOUNTING personnel have been announced by R. E. Brennan, Portland General Electric Co. treasurer and comptroller following the departure of Lester G. Park, assistant treasurer and general auditor, now in the Navy. E. I. Snyder, formerly tax supervisor, was named assistant treasurer. T. W. Fryoux was advanced from assistant general auditor to general auditor. C. J. Lawler was made chief clerk.

● GARTH CHAMBLIN, son of Clyde L. Chamblin, has joined the firm of Hudson & Grady, consulting electrical engineers, San Francisco. For the past year he has been on the design staff of Bechtel-McCone-Parsons at the Marin shipyard and previously had been associated with his father in the San Francisco firm, California Electric Construction Co.

● E. R. WOOLLEY, sales sponsor for the northwest group of companies in the Electric Bond and Share system, has been commissioned a lieutenant (s.g.) in the Naval Reserve. He is stationed at present in New York, attached to the Office of the Inspector of Naval Materials.

Nanaimo-Duncan Elects New Members To Board

W. J. Borrie of Vancouver and Lamont Ross of Nanaimo are new members of the board of directors of Nanaimo-Duncan Utilities Ltd., Nanaimo, B. C., as the result of a ballot of shareholders taken at the recent annual meeting. All but one of the seven members of the previous board were re-elected and the board was enlarged by one member.

Charges by those seeking changes in the board that policies of the company were directed from the East led to prolonged. and at times acrimonious, debate. Directors stated that a majority of the stock and a majority of the shares are held in the West, while all directors are Western men.

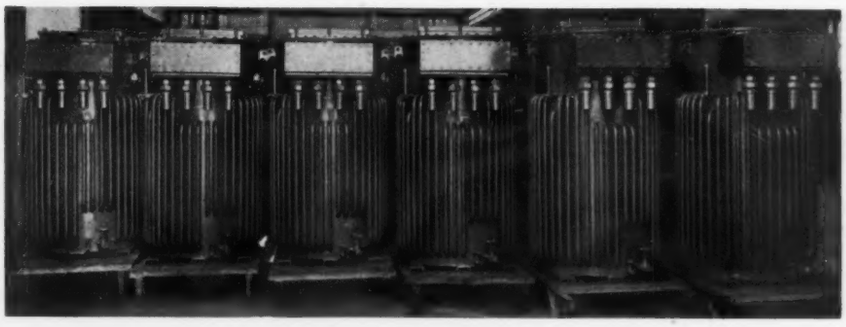
The board of directors as it now stands comprises: Brig.-Gen. J. A. Clark, president; George Kidd, vice-president; Gordon Farrell, R. C. Buchanan. J. Fyfe Smith, R. H. Tupper, Borrie and Ross.

● VICTOR C. MOULTON, electrical inspector, Mountain States Inspection Bureau. Denver. Colo., was elected president of the Western Section, International Assn. of Electrical Inspectors at the annual meeting in Detroit in October. He was secretary-treasurer of the Rocky Mountain Chapter. Born in Rawlins, Wyo., graduate of University of Colorado in 1912, electrical engineering, he worked for Westinghouse until 1917 and after service in the War and other occupations, again went with Westinghouse in 1924. Later he worked for Southern Colorado Power Co. in Pueblo as commercial engineer and in 1930 joined Mountain States Inspection Bureau as electrical inspector.

● REED R. SMITH, manager of Smith Electrical Co., Ogden, Utah, and immediate past chairman of the Electrical League of Ogden, died, aged 48, at Ogden early last month, of asthma. Born in Centerville, Utah, he lived for a while in San Bernardino, Calif., returning to Ogden in 1934. Five years ago he formed Smith Electric Co. with C. Angus Wright and only recently bought out the latter's interest.

● WILLIAM TALBOTT, JR., son of William Talbott, meter superintendent, San Diego Gas & Electric Co., has joined the Westinghouse organization in Los Angeles. During the New York World's Fair, Talbott was with the General Electric Co. "House of Magic" in New York.

● HARRY LAWRENCE COOK, salesman for the General Electric Supply Co. of Seattle for the past 10 years, died recently at the age of 60. He was born in Columbus, Ohio, and went to Seattle from Portland, Oregon.



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● R. HALL has been given the dealer relationship work of the B. C. Electric Railway Co. Hall has been secretary of the Electrical Service League of British Columbia, which position he still holds. Regulations of the Canadian federal government recently froze electrical ranges, leaving a large stock of such ranges in the hands of dealers. No restrictions have been placed on sale or installation of second-hand ranges and Hall is busy trying to clarify the situation on behalf of dealers.

● GERARD SWOPE, president of General Electric Co., has been awarded the Hoover Medal for "constructive public service in the field of social, civic and humanitarian effort." He is the fifth to receive the medal which was formally instituted in 1930 during the celebration of the fiftieth anniversary of the American Society of Mechanical Engineers.

● LANGTRY BELL, one of the best known figures in the electrical appliance, radio and music fields in British Columbia, is in charge of the piano department opened by the electrical dealer organization of Clarkson's Ltd. at Hastings and Homer Sts. in Vancouver. Bell was for many years manager of the Kent Piano Co. at Vancouver and was responsible for development of the big electrical appliance division established by that firm. Later he was manager of a branch store operated by Clarkson's. He was the first president of the old Greater Vancouver Radio Trades' Assn. and was later elected president of the electrical appliance dealers division of the Retail Merchants' Assn. at Vancouver.

● G. H. BISHOP, retired Southern California Edison Co. photographer, left Los Angeles Oct. 22 by airplane for San Jose, Costa Rica, where he will be official photographer for the United States government on the Pan American Highway through Central America. Bishop and his staff will travel by plane or horseback throughout the Central American countries, making official highway progress records, both in moving pictures and stills. Bishop retired from the Edison Company in 1939 after 35 years of company service.

● AL R. BAILEY, assistant to the president of the Coast Counties Gas & Electric Co., is now a major in the Army.

● A. L. SHELLWORTH for eight years manager in Portland for Sunset Electric Co., distributors of Frigidaire appliances, has gone with the Oregon district office of the WPB as manager of materials redistribution branch. Inventories of idle and excess materials that are useable in the war effort will be catalogued, after which these materials are to be made available by WPB to manufacturers of war supplies.

● A RECENT state supreme court decision held that Harry J. Martin, first president of the Electric Club of Washington and formerly Seattle manager of the National Carbon Co., filed his declaration of candidacy for the Seattle Port Commission too late to run in the Nov. 3 election.

● HORACE L. WHITE for some years Pacific Coast manager of the Crouse-Hinds Co., has been given added responsibility as manager of the entire central district in addition to the Pacific district. He will commute between Chicago and Los Angeles, his home.

● EARL JOHNS, California Electric Power Co., has been transferred from Elsinore to the central office engineering department in Riverside. Taking over his former duties as superintendent at Elsinore is Frank Lucking, who was moved there from Victorville.

● KINSEY M. ROBINSON, president of Washington Water Power Co., Spokane, has been elected to the board of trustees of the Manufacturers' Assn. of Washington. Robinson succeeds Paul H. McMillan of Roche Harbor, resigned.

● HERBERT H. IDLE was named secretary of the Arizona Edison Co. Inc. at a meeting of the directors in Phoenix on October 27. He had been Globe division manager and will be succeeded there by T. T. Parker.

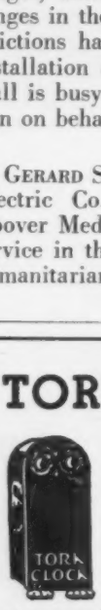
● HAROLD T. RANKIN, superintendent of the Denver Lighting Department, has been appointed head of the Blackout Committee for Colorado and will have control over all blackout activities for the state.

● HANCE H. CLELAND, president of the San Diego Gas & Electric Co., has been installed as president of the San Diego Chamber of Commerce. He had previously been a director.

● CAPT. E. BAUM, vice-president of Maydwell & Hartzell, San Francisco, reported for active duty in the Army on Nov. 23. He is with the Signal Corps.

● IRWIN LINDENBAUM, proprietor of Lindy Electric Co., San Francisco, died in Redwood City, Oct. 30.

TORK CLOCKS



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TRADE notes

Joshua Hendy Absorbs Eastern Firm by Purchase

Reversing the customary trend, Joshua Hendy Iron Works of San Francisco and Sunnyvale, Calif., has absorbed the Crocker-Wheeler Electric Mfg. Co. of East Orange, N. J., by outright purchase. The deal was to be ratified by Crocker-Wheeler stockholders at a special meeting Dec. 10.

Joshua Hendy is currently one of the largest manufacturers of triple expansion marine engines in the U. S. with capacity nearing one engine per day. In addition it is a licensee of Westinghouse for the manufacture of small steam turbines and gears. The Crocker-Wheeler deal will make the company an increasingly important factor in the shipbuilding development on the Pacific Coast.

● GEORGE E. HONN, San Francisco manufacturers' representative, has acquired several new accounts for northern and central California and western Nevada. Honn will represent the Burndy Engineering Co., New York; the States Co. of Hartford, Conn., and the Minerallac Electric Co. of Chicago, in addition to the lines he now handles.

The Honn organization has been expanded with the addition of Harry L. Wintersgill who will work on outside sales. Wintersgill has been with the Albert S. Wirtner Co. for several years and prior to that was connected with Westinghouse, Pacific Gas and Electric and Great Western Power companies.

● WASHING MACHINE PARTS CO. of San Francisco recently moved to expand its service facilities. Formerly at 123 Tenth St. it moved to 1321 Mission St. where it has 9,000 sq. ft. of space devoted exclusively to washing machine parts. H. F. Packer is manager. The company also has a store in Los Angeles.

● ANGELIS SALES & SERVICE, San Francisco, recently moved to larger quarters at 940 Mission St. It is the authorized service and parts station for Easy Washing Machine.

● ART ELECTRICAL ENGINEERS LTD., Vancouver, B. C., has opened a branch business at 963 Yates Street, Victoria.

H. & H. Electric Company has moved from 1308 Sixth St., Los Angeles, to 1260 Sixth.

Coastal Sales Co., formerly at 2515 La Jolla St., Los Angeles, has moved to 2916 East Florence, Huntington Park.

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420 Market Street **San Francisco, California**

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COLUMBIA ELECTRIC MFG. CO. — Crompton Tong Test Ammeters
CORNELL-DUBILIER ELECTRIC CORP. — Capacitors for Power Factor Correction
T. J. COPE, INC. — Underground Tools and Equipment
HERMAN D. STEEL — Meter Jewels
KELLEMS CO. — Cable Grips for pulling & permanent support
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And there's just as much difference between the *streamlined* BRIEGEL METHOD of making conduit connections and former, old-fashioned methods!

Take a look at the picture below: two squeezes with the patented B-M "indenter" (which costs only $1.25) and you have a smooth, efficient job when you use B-M connectors and couplings. No extra turns or twists—no nuts to tighten!

The BRIEGEL METHOD saves you up to 50% on time and a substantial materials-saving (in keeping with today's thinking). Means more profit, too. Approved by Underwriters' Laboratory, of course.

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PROFILES *of the month*

Right: R. E. Harris, general manager of Standard Electric Corp., wholesale distributor of appliances in San Diego for 15 years. His firm recently built a new building; is changing its stock to fit a wartime economy: Below: Russell E. Porter, Southern California Edison Co. lineman, receives from company president, Harry J. Bauer, the Edison Electric Institute Medal for saving the life of a fellow worker by pole top resuscitation. Porter joined the Edison company organization in 1936, is located in the Montebello district

Robert P. Burrows (left, below), formerly manager of lamp sales for Graybar's San Francisco district and now a top executive with the G-E Lamp Department at Nela Park, Cleveland, received publicity recently for his idea of a miniature model air raid control room for standardizing operations in Ohio communities. Burrows, with Robert E. Dirks who also worked on the model, shows how it can be used to demonstrate practical arrangements for speeding up report center operation

The light that shall never fail!

There will be a Christmas wherever our boys are. The lighted tree will be there, too—real or envisioned.

Somehow this tree symbolizes the ideal for which they are fighting — democracy's determination — that the light of Faith and Freedom shall not perish from this Earth.

You can count on it, our boys will observe their Christmas as good Americans. Boys, now turned men, who not many years back thrilled to the big package under the lighted tree at home. Or whooped in delight at a football suit or a surprise bicycle suddenly appearing from secret hiding.

Like their fathers of another war, they will make sure that there is no dim-out of the brightness of Christmas for them. They will share Christmas in new-made comradeship. They will share Christmas as big brothers from America to put sparkle back into the eyes of war-saddened children in foreign lands.

Light your tree at home in dedication. Share your Christmas with a boy in service. Buy War Bonds in remembrance. Keep buying War Bonds that the light of Faith shall never fail. Buy War Bonds that no hand will be empty when a fervent voice says—"Praise the Lord and pass the ammunition."

BUY MORE WAR BONDS ***AND SAVINGS STAMPS***

PACIFIC GAS AND ELECTRIC COMPANY

A REPORT - - -

Some months ago the Pacific Coast Electrical Association announced a free service to California municipalities. To save them the job of interpreting the multitude of federal wartime orders affecting electrical codes, the Association offered to abstract this information and send it out on filing cards which could be read and then retained for reference.

This is to report a very successful follow through on that idea. Twelve cards have been sent out reporting on 18 interim amendments to the National Electric Code plus one ruling of the WPB. These cards have gone to virtually every electrical or building inspector in every incorporated city in the state. They have saved countless hours of study and have prevented many mistakes.

They will continue to be distributed by the Association's Code and Ordinance Committee as long as the war lasts, and we take this opportunity again to invite any city official who can use this service to ask for it.

If your city is not using the Uniform Electrical Code, our representative in San Francisco or Los Angeles will be glad to talk it over with you and explain its benefits.

PACIFIC COAST *Electrical* ASSOCIATION

447 SUTTER STREET, SAN FRANCISCO — 601 W. FIFTH STREET, LOS ANGELES